

In This Issue—*The Leaks in Your Business*

MOTOR AGE

Volume XXXVIII
Number 12

PUBLISHED WEEKLY AT THE MALLERS BUILDING
CHICAGO, SEPTEMBER 16, 1920

Thirty-five Cents a Copy
Five Dollars a Year



champion Dependable Spark Plugs

Keep Your Truck Going

USE Champion Spark Plugs to cut truck costs. They aid greatly in profitable, continuous truck operation, by ending many of the costly delays for repair and adjustment.

Champion No. 3450 Insulator effectively withstands the constant shocks, heat and vibrations to which truck motors are subjected in their long, daily grind of heavy duty work.

Champion dependability accounts for Champion Spark Plugs having been adopted as standard equipment by more automobile, truck, tractor and engine manufacturers than any other make of spark plug.

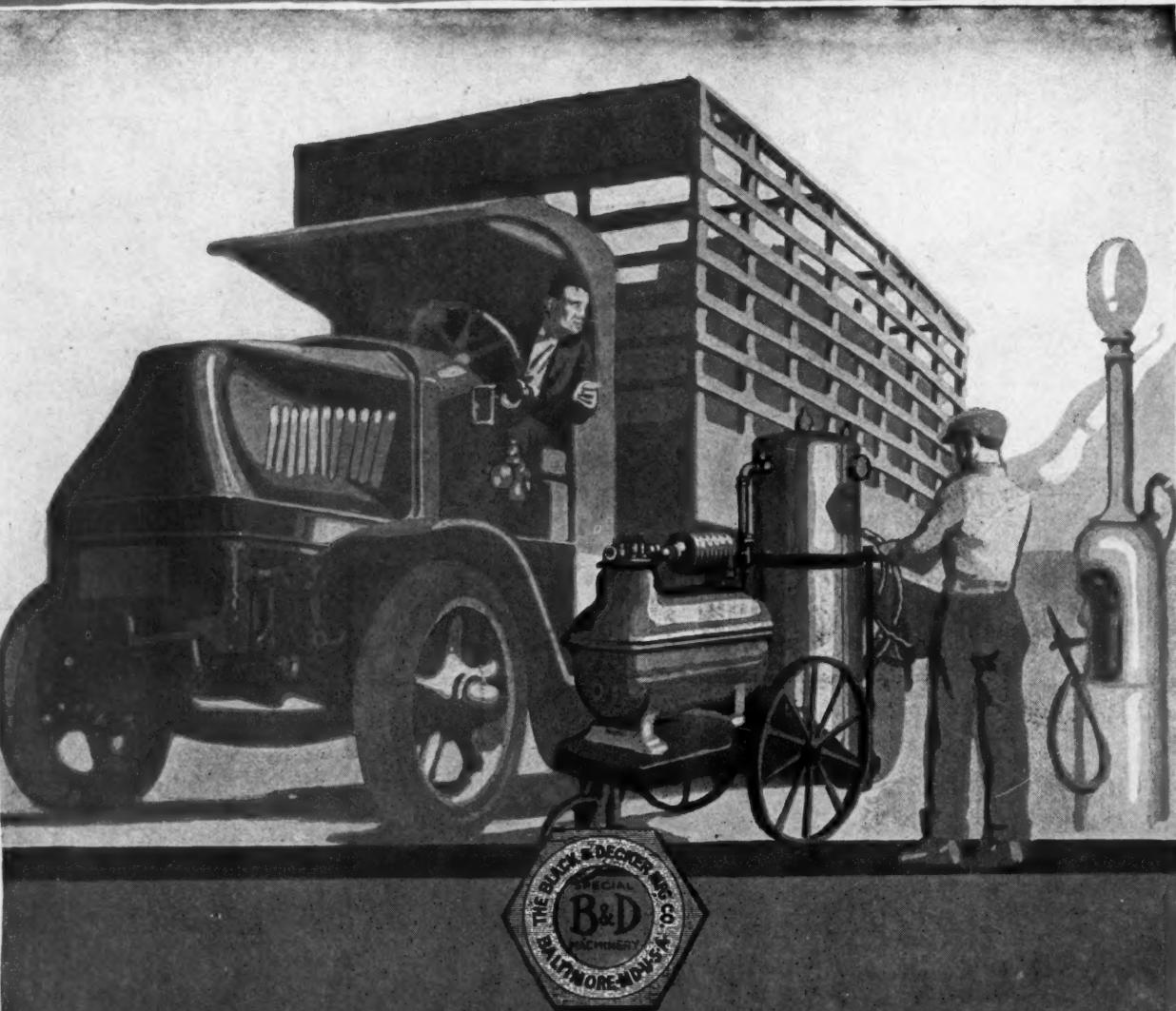
There is a Champion Spark Plug specially designed for every type of gasoline engine.

Dealers should make sure their stocks are complete.

*Be sure the name Champion is on
the Insulator and the World
Trade Mark on the Box*



Champion Spark Plug Company, Toledo, Ohio
Champion Spark Plug Company, of Canada, Limited, Windsor, Ontario



"FIFTY GALLONS OF GAS —and Some Air in My Rear Tires"

Unless you are equipped with a compressed air outfit that will inflate a pneumatic truck tire quickly, you are not going to satisfy your truck trade.

Giant cords are now widely used on trucks and quick air service is an important factor in maintaining and building your truck business, and this business is worth while too.

A truck consumes more gasoline and oil per mile than a passenger auto and operates more continuously.

BLACK & DECKER

No. 46 ELECTRIC COMPRESSOR

pumping direct, inflates a 44 x 10 tire from flat to 140 pounds pressure in 6.3 minutes.

It is built for heavy service. Positive Air Cooling by Black & Decker Patented Forced Draft method, grease lubricated

We will gladly send complete catalogue on request.

throughout—no oil used anywhere—no exposed gearing or belting—clean, accessible, serviceable.

Sold by the leading automobile accessory, hardware and electrical houses.

THE BLACK & DECKER MFG. CO.

General Offices and Plant
TOWSON HEIGHTS, BALTIMORE, MD., U. S. A.

BRANCH OFFICES:

New York, N. Y.

Detroit, Mich.

Philadelphia, Pa.

Cleveland, Ohio

Atlanta, Ga.

Buffalo, N. Y.

San Francisco, Cal.

Houston, Texas

Chicago, Ill.

MOTOR AGE

Published Every Thursday by

THE CLASS JOURNAL COMPANYMAILERS BUILDING
59 East Madison Street, CHICAGOHORACE M. SWETLAND, Pres. W. I. RALPH, Vice-Pres.
E. M. COREY, Treas. A. B. SWETLAND, Gen. Mgr.
Member Audit Bureau of Circulations; Member Assoc. Business Papers, Inc.

Vol. XXXVIII Sept. 16, 1920

No. 12

Contents

Checking Service Losses	7
A half dozen ways by which you can add to the efficiency of your business and stop profit-eating waste.	
Belt or Motor-Driven Machines?	10
A comparison of the cost of each method of shop practice and why one is more profitable in the long run.	
Getting Tomorrow's Mechanics	12
A new source of supply of mechanics has been opened by the training of disabled soldiers in automotive lines—You may be able to acquire their services.	
Sheet Metal Restoration Service	15
Few people realize the wonders that can be worked by the sheet metal man in renewing damaged fenders and bodies.	
Plenty of Money	16
An article written expressly for the purpose of showing the business that may be built up in a small town.	
News Section	
Increased August Production	19
Dealers Build Village at State Fair	20
Proper Business Plane Not Yet Reached by Dealers	22
Good Outlook for Tire Sales Seen	22
Dealer Association Against Over-Production	23
Changes Being Made in Briscoe Organization	23
R & V Production Not Affected by Sale	24
Holmes Co. Does Not Figure in Infringement Suit	24
Dealer Maintains Interest in Time Sales	27
Southern Finance Corp. Formed in Georgia	26
Refute Report of Too Many Cars in Atlanta	26
Dealer Maintains Interest in Time Sales	27
Many Foreign Cars Coming in American Market	27
Try to Tax Manufacturers on Retail Price	28
Geo. Fritz Resigns Equipment Body Position	28
Banks Have Tents at Maryland Show	29

Departments

Better Business	32
Standard Mechanical Tractor Operations	34
Autogenous Welding	36
Automotive Architecture	38
Readers' Clearing House	40
Service Equipment	46
The Accessory Show Case	47
Law in Your Business	48
Weekly Wiring Chart	49
Valve Timing Data Sheet	50
Automotive Repair Shop	51
Electrical Equipment Table	52
From the Four Winds	56

MOTOR AGE

MAILERS BUILDING
CHICAGOPhone Randolph 6900
Cable Address "Motage"

E. E. HAIGHT, Manager

DAVID BEECROFT, Directing Editor

RAY W. SHERMAN, Executive Editor B. M. IKERT, Editor

BRANCH OFFICES

DETROIT, 95 Fort St., W., Phone Maine 1351

CLEVELAND, 536-540 Guardian Bldg., Main 6432

NEW YORK CITY, U. P. C. Bldg., 239 W. 39th St.

Phone Bryant 8760

PHILADELPHIA, Widener Bldg., Phone Locust 342-343

SUBSCRIPTION RATES

United States, Mexico and U. S. Possessions	\$ 5.00 per year
Canada	7.00 per year
All Other Countries in Postal Union	10.00 per year
Single Copies	35 cents

Make Checks Payable to Motor Age

Entered as second-class matter, September 19, 1899, at the Post Office, Chicago, Illinois, under Act of March 3, 1879.
 Owned by UNITED PUBLISHERS CORPORATION, 239 W. 39th St., New York, H. V. Swetland, Pres.; Charles S. Phillips, Vice-Pres.; W. H. Taylor, Treas.; A. C. Pearson, Sec.



"NORMA" PRECISION BALL BEARINGS

(PATENTED)

Serviceability reveals itself to no more superficial examination. It demonstrates itself by the hard, cold facts of performance. And records of performance done tell what records of performance may be anticipated. For years past, "NORMA" Precision Bearings have been—as they are today—the standards in the high-grade ignition apparatus and lighting generators identified with cars, trucks, tractors and power boats having the most consistent records of high-duty performance.

See That Your
Electrical Apparatus
is "NORMA" Equipped

THE NORMA COMPANY OF AMERICA

Anable Avenue
Long Island City
New York



Ball, Roller, Thrust and Combination Bearings

Stop "Missing"!

Are you "missing fire" on Spark plug sales? Stop it by handling Hercules Giant Spark Plugs. They're advertised in the largest national publications and every advertisement instructs the reader — "Ask Your Dealer for Hercules Plugs."

You are the one who loses if you don't back up this national advertising. You can handle Hercules — you can make Hercules advertising and Hercules Dealer Helps increase your spark plug sales. Write today for the Hercules Dealer's proposition.



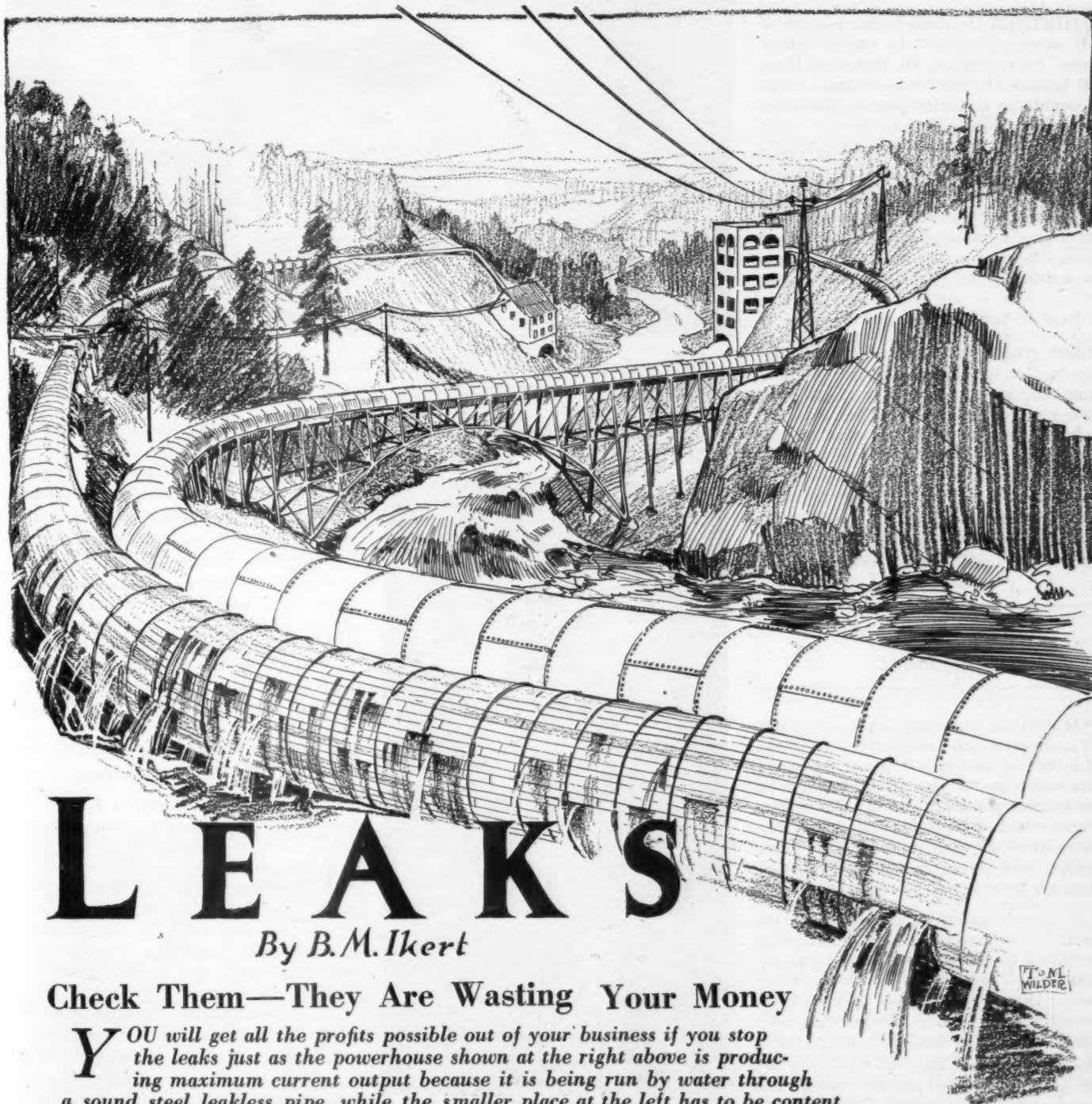
Advertisements like this are reaching practically every car owner through the leading national magazines, and farm papers during 1920.

ECLIPSE MFG. CO.,

Indianapolis, U. S. A. Makers of

HERCULES GIANT SPARK PLUGS

MOTOR AGE



LEAKS

By B.M. Ikert

Check Them—They Are Wasting Your Money

YOU will get all the profits possible out of your business if you stop the leaks just as the powerhouse shown at the right above is producing maximum current output because it is being run by water through a sound steel leakless pipe, while the smaller place at the left has to be content with a small power output because the leaks in the old fashioned wood pipe are depriving the water current from its full driving force. Probably every automotive dealer could keep a man busy in his service station checking up and preventing the leaks that are sapping the full driving power of the business and thus preventing more profits. For a start see where the half-dozen suggestions on the following pages apply to your business.

A Half-Dozen Ways You Can A Man Could Be Kept Busy In the Average Service

1 Conduct Your Business Intelligently

WHETHER the dealer runs a large or small business he must know where he stands at all times or there will be leaks in the business and he will be unable to instantly put his hands on the source of these leaks.

If your volume of business is small you may be able to hire a bookkeeper for part time only. An accountant often can save a business several hundred dollars a year in preventing the many small losses likely to occur if the business is not watched down to the minutest detail.

Be Sure of Your Profits

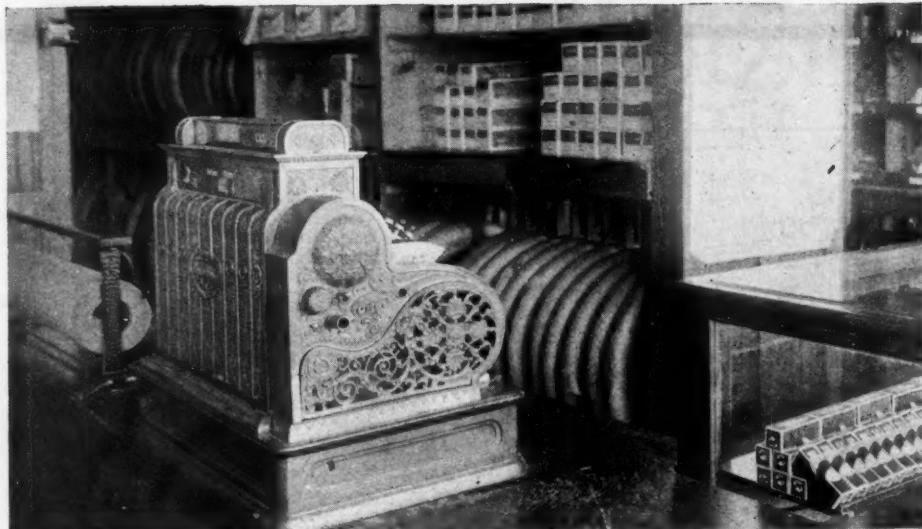
Know where you stand. You must be able to tell whether your parts department, your shop or battery department is making or losing money. Your place of business may be crowded most of the time and to all appearances you may be making money, but in the language of the street you may be "kidding" yourself on your service and not be making the profits possible by properly recording and charting your service costs.

2 Get the Proper Equipment

CHOOSING the right equipment will help materially in stopping the leaks in a service station. It is not necessary that every dealer buy all the equipment the market affords, but there are certain things which have become almost necessities to every shop in these days when skilled help is scarce and service work piles up all the time.

Workmen cannot do good work on the floor. It is hard to get at a job and a workman is inclined to slight things because it is difficult to do them, which means that a customer is sure to come back later on to have the job done over again. And this doing the job twice is one big item to stamp out when you are checking up on your service losses. The installation of a machine often will replace a man and not only that, the machine will turn out a better job and do it quicker; all of which means stopping leaks and making more profits.

Old-fashioned hand methods are costly. Take valve grinding, for instance. A



Many profits are lost because the dealer does not know where he stands. A cash register and accounting system soon will discover the leaks that are draining profits

mechanic who tries to true up the face of a valve with a file is courting trouble



Doing things in the old way is expensive, while modern methods speed up work and make more profits possible. An electric drill, for instance, is almost a necessity nowadays

and the dealer who tolerates this is losing profit, because the job is going to come back a second time. All this can be eliminated by simply investing a few dollars in a small valve lathe or truing device that even an inexperienced man can operate. This is but one instance.

There are many electrically driven tools that speed up work and conserve the energy of the men. Electric hand drills, for example, will pay for themselves because more work can be done in a given time. Make sure your shop has equipment to speed up service work.

3 Watch Gasoline, Rags, Waste, Etc.

MOST mechanics use twice as much kerosene or gasoline when cleaning parts. The same is true of cotton waste or rags for cleaning. There is no reason for using half a pound of waste in cleaning up a job when a few ounces will suffice. Emery and sand-paper is another item which makes for considerable waste. Instead of giving a mechanic a whole sheet of emery paper, why not try a half-sheet. The chances are the half-sheet is plenty big enough for the job.

Check the Small Items

Oil and grease very often are not recorded on a repair job and it does not take many of these items to eat into the profits of the shop. Mechanics should be required to get requisitions for oil and

Check Your Service Losses

Station To Eliminate or Minimize Wasteful Methods

grease the same as for parts. To many, this will be an old story, but it is surprising how many small service stations run on a hit-and-miss basis and never think of charging for oil and grease. Too often the grease bucket stands unguarded and the mechanic simply reaches in with a paddle and fills a transmission or axle with no one to guard the bucket and its contents. Put your oils and grease under lock and key and have someone responsible for every ounce that goes out.

4 Look Out for Broken Tools, Etc.

Men often get careless with tools. Broken tools have to be replaced and tools cost money these days. Some dealers find it an excellent plan to have the men furnish their own tool kit and in such cases the men usually are more careful. The shop, of course, furnishes additional tools and machinery.

Tool Losses Soon Mount Up

It is a good plan to have a rack for the shop tools and each night check up and see if every tool is in its place. This will prevent loss and the tools will not become damaged from being thrown about carelessly. It is not uncommon to see files lying about the bench or floor with other tools striking them, thus destroying the cutting edges. This may seem to be a small item, but go into any shop run on a careless basis and note the condition of the tools. The frequent necessity of having to buy new tools eats into the shop profits.

A drill perhaps may be dull and the mechanic stops his work to sharpen it. In an institution large enough it should be the duty of one man to keep the tools properly dressed. Where the organization is not pretentious enough to have one man take care of the tools it is much more profitable to have one man spend a half a day a week in sharpening up the tools.

A little talk occasionally by the service foreman on his findings with regard to the use of the tools is very helpful. We all know that when in a hurry a screwdriver is used as a chisel. Too large a wrench is used on a nut, with the result that the jaws are spread. Attention to these little things will produce larger returns on the tool investment.



The free air idea is a hang-over from the old days. Why should dealers maintain expensive pumping stations and free air service and thus add many dollars to their overhead to give something away?



Don't do your repair work on the floor. Lack of proper equipment in many service stations is responsible for a loss of profit. Good equipment means doing the job but once

5 Have Understanding With Customers

HERE must be an understanding between customer and dealer if leaks in the profits are to be stopped. The flat-rate plan of charging for repair work immediately tells the customer just how much he is going to pay when he calls for his car. Proper understanding on both sides will go a long ways towards eliminating having to make "adjustments" on the bill for the work.

Give Owner Duplicate Repair Order

A man may find when he gets into a job that more work ought to be done than the customer originally ordered, but it is a mistake to go ahead on the assumption that the customer will stand for the work and pay the resultant larger bill. Every customer should be presented with a duplicate of the repair order and have some idea as to what is going to be done and what the cost will be.

Adjustments on bills often put the cost of a repair job so low that there is an actual loss. There is a keen sense of satisfaction when a customer comes in and you know he is going to lay down the exact amount of money which both he and you know is right for the job.

6 Charge for Your Air Service

THE so-called free-air service, a hang-over of the old days is a factor eating into the profits of many service stations. Just why dealers should give this commodity free of charge when they charge for practically everything else in connection with their business is not a matter for discussion here. But the fact remains that the equipment necessary to furnish air costs much money initially and for maintenance. The free air service is a matter much abused.

They Would Be Willing to Pay

Originally motorists wanted a place to pump air into their tires without having to exert their own energy. The free air stations were the result and the motorists wanted service. They would readily have paid a few cents for the service thus rendered, but unfortunately the system did not start that way and most dealers still feel they have to abide by the old plan. However, motorists would be willing to pay 5 or 10 cents per tire to have them pumped with air and tested for pressure with a gage.

Belt or Motor-Driven Machines?

While the Initial Cost of Direct-Driven Machinery is Higher, It is Offset by the Extra Investment in Belts, Pulleys, Countershafts and Upkeep Necessary with Belt-Driven Machinery

UPON entering most repair shops, it is evident that much improvement could be made in the arrangement of the machines and equipment. This is particularly true of shops which have grown from small beginnings, and additions to equipment have been made as needed. Too often the most suitable location for a

new tool was already occupied by another which, in turn, should occupy still another position had not that already been filled. In placing the first tool when the shop was built there was plenty of room and not much thought was given to the layout of machines aside from installing them without an undue use of line shafting and pulleys.

AS TIME passed, more equipment was installed, shafting was extended, the old motor became insufficient as a source of power and a larger one installed. This should have been the turning point.

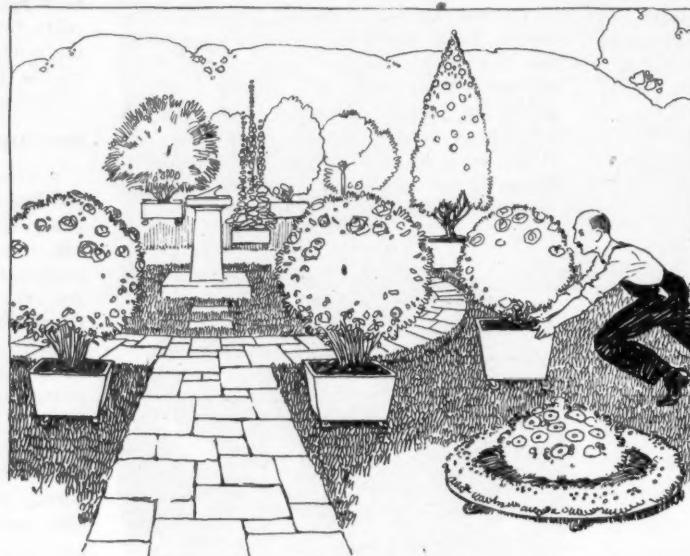
If, instead of turning in the old motor and getting a new one of greater capacity, a machine with individual motor drive had been installed, future difficulties would have been avoided. This, however, is a step most garagemen, considering the extra cost, hesitate to take.

Instead of a motor at a cost of from \$40 to \$100, they think of a pulley costing only three or four dollars, but this is what results: Pulleys and belting cost more than had been estimated, and a counter-shaft for control and regulation of speed is needed. Then it becomes necessary to drill holes in a brick wall for expansion bolts to hold the counter shaft.

The Cost of Line Shafting

A machine is needed, so a man from a two-dollar-an-hour repair job is taken to do the work. Of course, no account is kept of the cost of the different installations, but if this was done, the result would be something like the following:

1 split pulley	\$ 5.00
1 countershaft	7.00
4 expansion bolts	.80
.12 ft. 4 in. belt	11.52
14 ft. 3 in. belt	10.08
Lacing	.50
Labor drilling holes	1.20
Labor adjusting, fitting pulley, countershaft and lacing two belts	5.00
	\$41.10



There once was a man who changed the flower beds around so much that his wife suggested putting them on castors so he could get a different effect at any time. Many of us probably have wished we could do the same with the machinery in our shops at some time or other

But that isn't all. His machine is anchored for all time in its present position and perhaps the next installation should, by all logic, go between this one and the one next to it where there is insufficient room. In any way the proposition is looked at the individual motor-driven machine is the thing. Power consumption is much less. The figures here show that the first cost is very little, if any more, depending, of course, on the size of the motor required. But the great big advantage, the one that means dollars and cents every day, is that with independent machines the whole shop layout may be changed over night.

A new condition may arise making it necessary for men to make many trips across the shop every day. The trips are doubled or tripled by forgetting to take necessary tools or bring them back again. If the machine needed in this work isn't anchored to a line shaft and a

counter-shaft, it may be moved to a more convenient location, connected up by a temporary wire and tried out before being permanently wired up. The new location might save two to five dollars a week in wasted time.

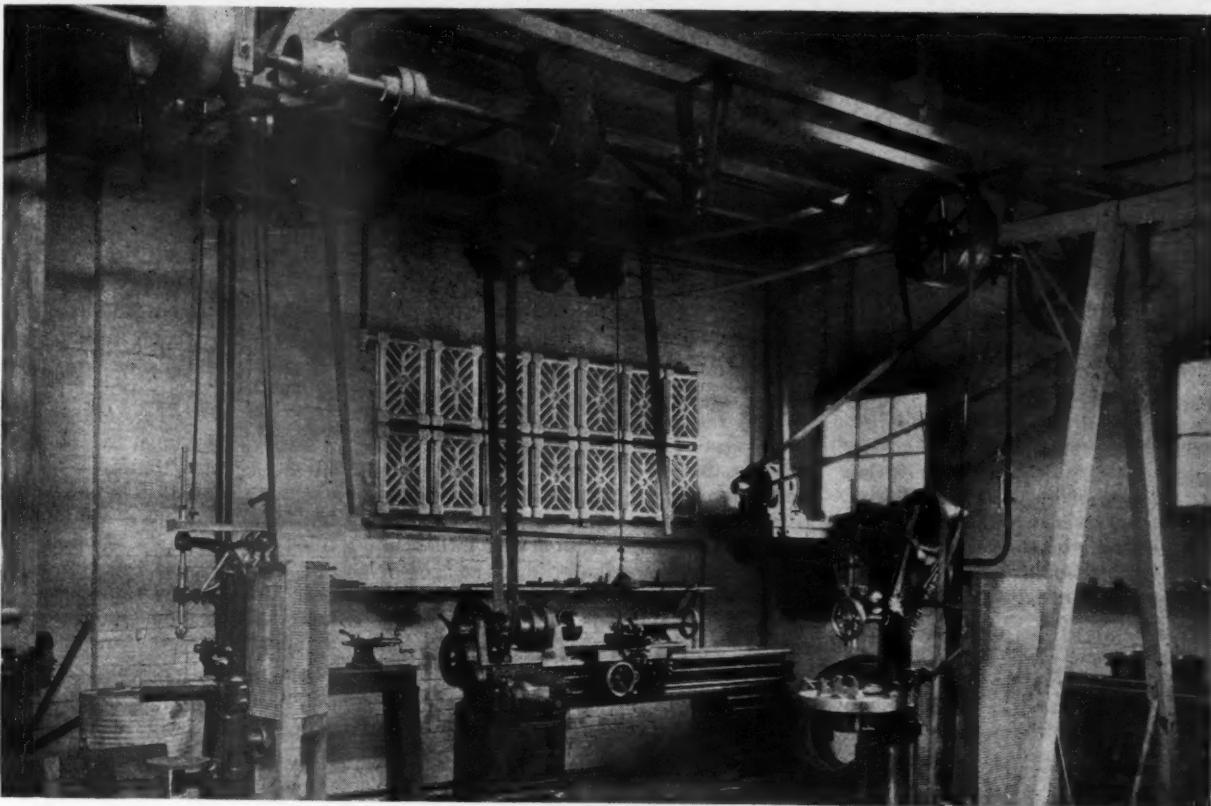
Old factories are especially addicted to bad arrangements and there is a case of a large motor car manufacturer that shut down completely and set all its help to moving machinery, with the result that handling was reduced greatly. Twenty-five per cent of space was gained for new equipment and output increased enormously. In this case complete departments were moved bodily in order to be handy to other departments. The gear cutting department was placed where the pattern shop had been so that the blanks from the forges in the next room could be received cut and passed on to the hardening room, which was adjacent with a minimum amount of handling. Formerly they had to be carried about a block, some here and some there, and after cutting, collected and brought back to be hardened.

Another Example of Waste Motion

Along the same line of increasing output by eliminating waste motion, the case of a certain manufacturer of automobile springs is recalled. This concern had its production facilities analyzed by an industrial engineer and it was found that the machinery was as poorly arranged that they were paying sixty per cent of their entire labor cost for walking, instead of for working.

By rearranging the equipment the spring maker was able to increase production 300 per cent.

The Line Shafting Governs the Machine Layout in Your Shop



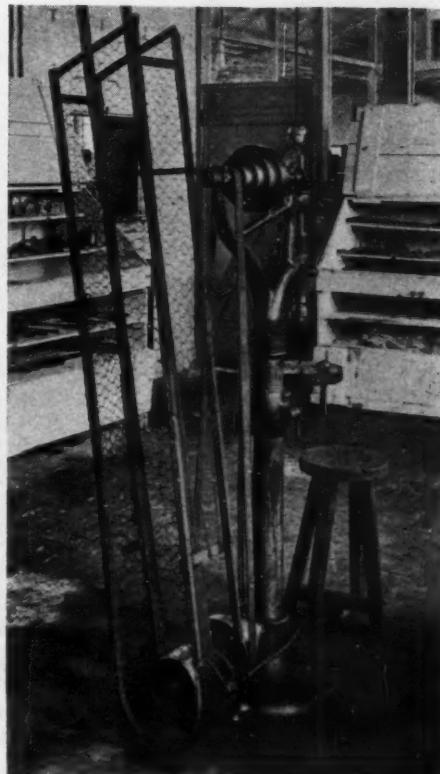
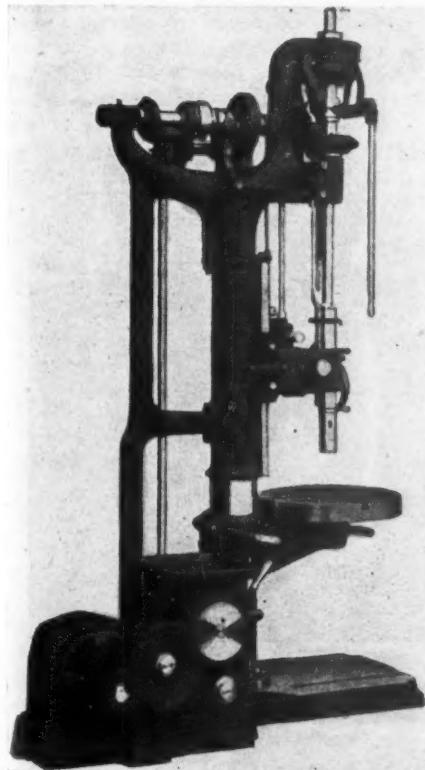
The placement of the machinery in this shop is governed largely by the line shafting. Of course, in a good many shops it seldom becomes necessary to shift the machinery around, but where a shop figures on future expansion it is well to bear in mind the fact that the line shafting is the dominating factor with respect to machine installation. Where individually motor-driven machinery is used the problem is easily solved, as it then merely becomes a matter of placing the machine where it is wanted and making the electric connection accordingly.

VALUE OF MOBILE EQUIPMENT

On the left is shown a direct-driven drill press which can be moved about at will as there is no interference from belting or countershafts. While this sort of equipment naturally is somewhat higher in price, the price often is more than made up in the saving of pulleys, shafting, countershafts, etc. Furthermore, a direct-driven machine has the advantage that it can be run whenever necessary without setting into motion the entire line shafting.

Where a shop gets power for all its machines from one motor there is the danger of tying up all the machines should the motor develop a fault. If a direct-driven machine goes out of commission it ties up that machine only and the work often can be finished on another machine.

At the right is shown a guard built around a belt driving a drill press, a procedure entirely eliminated with direct-driven equipment.



Getting Tomorrow's Mechanics

Here is an Opportunity for Dealers and Service Stations Needing Trained Mechanics to Obtain the Services of a Fine Type of Worker by Employing Some of the Men Being Trained by the Federal Board of Vocational Education

THREE is a large measure of relief promised for dealers and service stations whose chief worry has been the shortage of trained mechanics. The Federal Board of Vocational Education is schooling a great number of men disabled to a minor degree in the war to be skilled mechanics. Motor mechanics was an exceedingly important army occupation and many men inducted into the service learned to operate trucks and passenger cars

A RECENT report issued by the Federal Board of Vocational Education gives the number of disabled men taking automotive courses as 3,740; of these 2,150 are being given training along specific lines in schools, and 1,590 have been placed for training on the job.

The Federal Board has not founded its own schools but has preferred to use the facilities of existing institutions. Men in training on the job have been placed in both private and government establishments. They are scattered throughout

every state in the union and the District of Columbia. New York leads the states with 514 men in training to be automotive mechanics, Pennsylvania comes second with 348, and Illinois and California third with 220 each.

Capable of Excellent Work

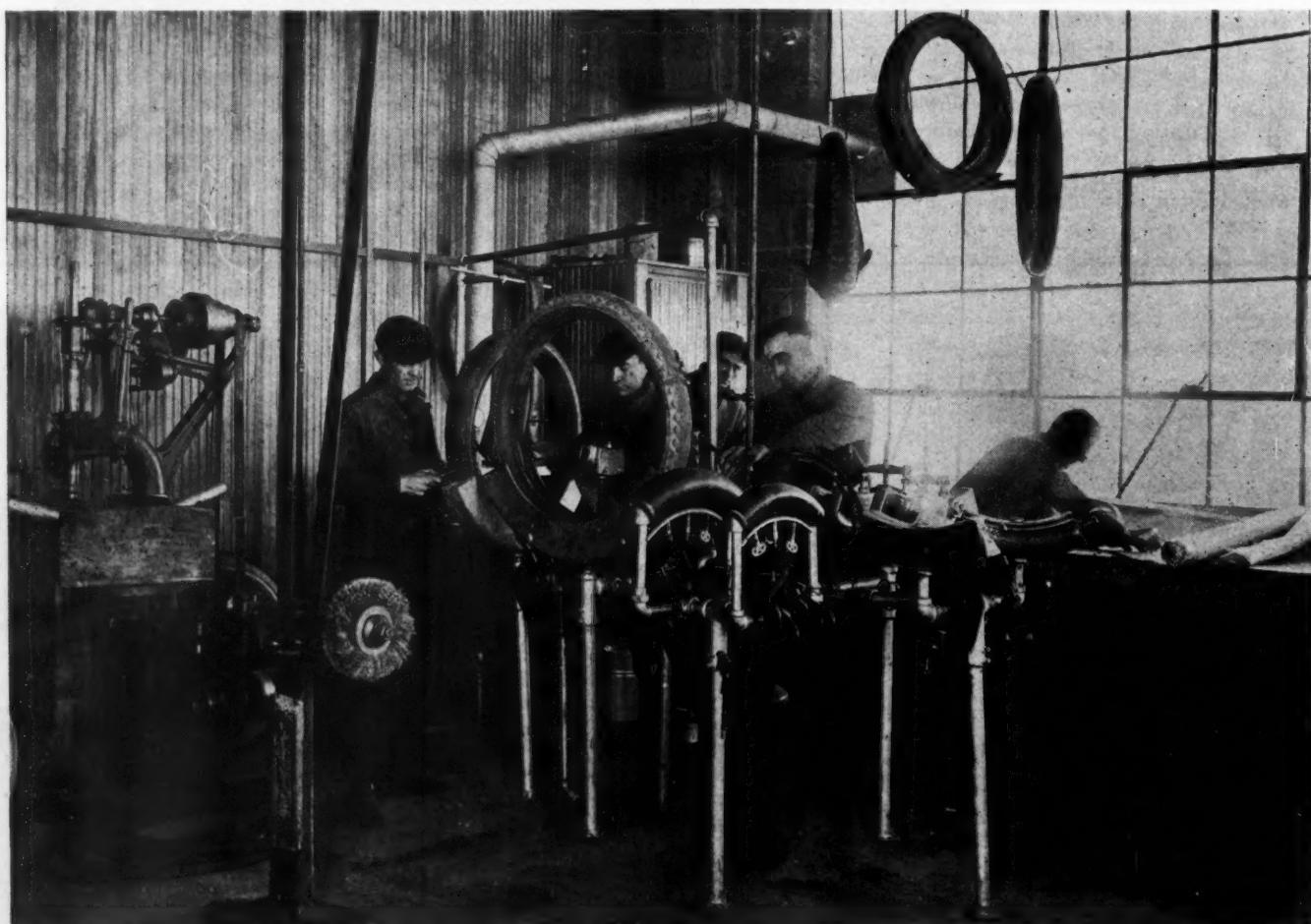
Men whose physical disabilities will not allow them to practice other branches of automotive mechanics are in many cases entirely capable of taking up tire vulcanizing and repair work.

behind the lines in France, and in serving the needs of camps and cantonments in this country.

PRACTICALLY all of the men in the service were more or less constantly in contact with motor driven equipment and naturally the interest aroused by this environment became in many cases a permanent interest, and in many cases of men disabled they have chosen to elect training courses in this field.

In a table issued by the Federal Board giving the total numbers of men in the various courses, it is shown that 135 are taking automobile driving; 2,415 automotive mechanics; 747 ignition, starting and lighting; 442 tire vulcanizing and repair, making the total 3,740. This total includes the men studying the operation and mechanics of farm tractors.

Men in the driving courses are trained to drive in light and in darkness, over rough roads and smooth, and are expected to have an intelligent under-



A class of ex-service men receiving training in vulcanizing tires at Mooseheart, Ill., under the supervision of the Federal Board for Vocational Training

This Table Shows the Number of Men Available and the Branches They Are Studying

States and Territories	Total	Disabled Men Taking Motor Mechanics Courses					
		Distributed by Character of the Course					
		In Schools	On Jobs	In Car Driving	In Mechanics	In Ignition, Starting, Lighting	In Tire Vulcanizing and Repair
Total	3,740	2,150	1,590	135	2,416	747	442
Alabama	57	29	28	2	40	10	5
Arizona	15	12	3	...	13	2	...
Arkansas	45	27	18	...	38	5	2
California	220	154	66	1	144	62	13
Colorado	105	72	33	3	48	51	3
Connecticut	52	24	28	1	46	5	...
Delaware	1	...	1	...	1	...	...
District of Col.	37	20	17	2	22	10	3
Florida	22	10	12	...	12	4	6
Georgia	88	34	54	1	74	6	7
Idaho	10	6	4	1	7	2	...
Illinois	220	152	68	14	146	39	21
Indiana	53	25	28	...	18	26	9
Iowa	54	25	29	...	41	8	5
Kansas	45	25	20	...	40	4	1
Kentucky	26	10	16	1	15	5	5
Louisiana	40	22	18	1	29	5	5
Maine	28	12	16	1	17	5	5
Maryland	106	40	66	5	36	16	49
Massachusetts	200	110	90	13	128	35	24
Michigan	127	57	70	3	97	20	7
Minnesota	92	59	33	2	55	21	14
Mississippi	23	13	10	1	13	6	3
Missouri	105	69	36	1	90	10	4
Montana	37	25	12	...	22	7	8
Nebraska	18	12	6	...	15	2	1
Nevada	2	2	...	...	2	...	...
New Hampshire	10	1	9	...	6	3	1
New Jersey	99	63	36	6	65	18	10
New Mexico	14	6	8	...	12	1	1
New York	514	354	160	40	310	92	72
North Carolina	44	17	27	1	39	1	3
North Dakota	23	16	7	...	19	4	...
Ohio	182	94	88	5	96	60	21
Oklahoma	85	40	45	1	55	25	4
Oregon	42	31	11	1	26	14	1
Pennsylvania	348	215	133	11	215	56	66
Rhode Island	10	6	4	1	8	1	...
South Carolina	24	11	13	...	19	1	4
South Dakota	10	3	7	...	5	4	1
Tennessee	47	14	33	1	34	6	6
Texas	146	66	80	3	96	33	14
Utah	42	24	18	...	27	14	1
Vermont	4	1	3	...	3	1	...
Virginia	64	22	42	6	34	9	15
Washington	71	45	26	3	42	16	10
West Virginia	37	12	25	2	25	2	8
Wisconsin	79	53	26	...	62	16	1
Wyoming	10	8	2	...	4	3	3
Porto Rico	5	1	4	1	4	...	...
Canada	2	1	1	...	1	1	...

standing of the rules of the road. Of course, a driver is also given a thorough knowledge of his machine so that he may keep it in good condition and give it any needed care aside from mechanical repair work.

The automobile mechanic is made thoroughly conversant with all parts of the machine; he is trained to understand the construction and adjustment of the modern gasoline engine; has practice in the repair and fitting of the various parts of the engine; is made familiar with the various types of engines now in common use; and is made to understand how to repair and keep in order other parts of the motor vehicle.

Build a Complete Tractor

In one instance, the counsellor of an eastern school bought a broken down car for \$25 in order that the men might tear to pieces and reconstruct a certain type of engine.

Federal Board men in a Pacific coast school did most of the work of building a farm tractor designed by the instructor in automotive mechanics. The patterns were made in the pattern shop of the

school, the machine-work in the machine shop, and the whole was assembled in the shop. This piece of work was particularly valuable in helping the men to understand the theory and construction of the gas engine.



Here is shown a class of returned soldiers studying the cars and repair of ignition devices in the department of trades and industry at Iowa State College, Ames, Iowa

There are 747 men specializing in ignition, starting, and lighting with special emphasis on battery repair and trouble shooting.

The men are given thorough training in vulcanizing and repair work on tubes and casings, most important as long as tire trouble constitutes a large proportion of motor misfortunes.

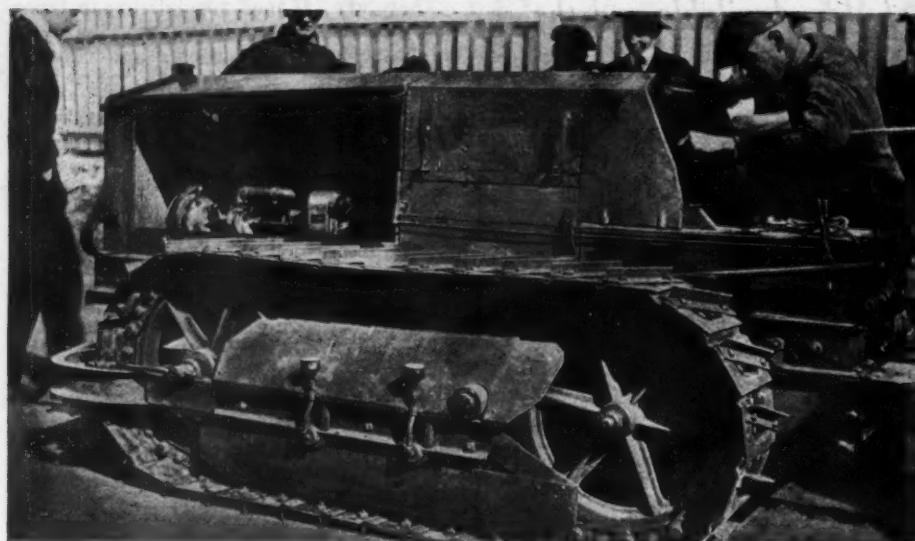
Of course, the number of men who will step forth into the ranks of motor mechanics and drivers is small in comparison with the number in demand. Therefore, the Federal Board men will have no trouble in securing permanent positions when their days of training are over. Some of them who have a little capital will set up their own shops.

The Federal Board insists that its functions are much broader than those of an employment agency. Its first and immediate business is not to find a job for any man. Its ideal is rather to train a man into employment, that is, the board trains a man with an eye always to the employment objective, places him in training on a job where he may stay after his days of learning are completed and in a line of work where his chances of success are greatest. The board watches over these men until it sees that they really are in paying positions which they, as skilled workers, will hold without difficulty on terms of competitive equality with their fellow workmen.

Are Located All Over U. S.

Automobile schools, factories, and repair shops all over the country have given the board a most generous co-operation. A study of the complete list of the 1,590 men in training on the job in automotive mechanics would show them located, a man or two at a place, in individual establishments all over the United States.

Automobile dealers can help re-establish these men in employment by taking into their establishments those who are preparing to become motor car salesmen. Dealers in second-hand automobiles can take the men into their repair shops. It should be understood that the men will



This tractor is the product of work in the California School of Mechanical Arts, San Francisco, Calif. It was designed by Mr. Herbert, instructor in automotive mechanics. Patterns made in the pattern shop, machined in the machine shops and assembled in the shop. Ex-service men placed in the school by the Federal Board for Vocational Education did much of this work

be thoroughly trained, skilled and competent workmen.

Dealers of all types who wish to obtain the services of these men and dealers who have new or old equipment which they are willing to donate for the use of the students should communicate with the nearest District Vocational Officer, or with the central office of the Federal Board for Vocational Education, 200 New Jersey avenue, Washington.

A complete list of District Vocational Officers for the fourteen rehabilitation districts of the United States follows:

1. F. T. A. McLeod, 101 Milk St., Boston.
2. R. T. Fisher, 2 W. 43rd St., New York City.
3. R. J. Fuller, 140 N. Broad St., Philadelphia.
4. W. H. Magee, 660 Lexington Bldg., Baltimore, Md.
5. C. G. Schulz, 823 Forsyth Bldg., Atlanta.
6. L. R. Fuller, 412 Maison Blanche Annex, New Orleans.
7. Louis Herbst, Denton Bldg., 7th and Race Sts., Cincinnati.
8. Chas. W. Sylvester, 14 E. Congress St., Chicago.
9. C. E. Partch, 6801 Delmar Ave., St. Louis.
10. C. A. Zuppann, 600 Keith-Plaza Bldg., Minneapolis.
11. H. Allen Nye, 400 Mercantile Bldg., Denver.
12. Nicholas Ricciardi, 544 Flood Bldg., San Francisco.
13. C. H. Anderson, 5th Floor, Arcade Bldg., Seattle, Wash.
14. W. F. Doughty, Dallas Club Bldg., Dallas.

FIRM CHANGES NAME

St. Louis, Sept. 9—The Auto Devices Co., manufacturers and distributors of motor car equipment, is now doing business in both St. Louis and Kansas City, Mo., under the name of the Tuthill Sales Co. With the change of name which was recently effected it is announced by Charles W. Price, president, that the personnel of the company is unchanged.

TRUCKS AID STEEL MOVEMENT

Youngstown, Ohio, Sept. 10—Motor trucks continue to play an important part in the reduction of the piled tonnage of

steel mills of the Mahoning valley. Trucking of tonnage to fairly distant points for rail shipments and direct to nearby and distant consuming points is being vigorously pushed. The use of motor transportation has demonstrated that the motor truck of general use in the valley, though not designed for steel shipments, could be made to serve this purpose.

Senator's Tour Finds Bankers In Three States Sold on Trucks

Many Dealers Are Indifferent to the Situation and Think Only of Passenger Cars

O KLAHOMA CITY, Sept. 10—While the great agricultural states of Kansas, Oklahoma and Missouri have been thoroughly sold on the money earning value of power farming, they offer almost a virgin field for the truck salesman. Strangely enough most of the dealers in this territory, especially in Oklahoma, appear utterly indifferent to the profits that are lying in their own back yards waiting to be picked up.

This has been the most striking point disclosed by the tour of automobile advertising managers and truck enthusiasts arranged by Senator Arthur Capper which started from St. Louis for the two-weeks' tour of the greatest grain growing section. The party has been greeted everywhere with whole-hearted hospitality and enthusiasm. The purpose of the tour was to preach the essentiality of automobiles, but it was found no education was necessary.

An especial drive was to be made upon bankers but they know as much about the value of trucks and tractors as the members of the party. They give all the

credit asked on good security for trucks and power machinery. The prospective purchaser of a passenger automobile, who hasn't the cash to finance the deal, has hard sledding, however. The bankers, almost without exception, shook their heads gravely when passenger cars were brought up on account of the order of the Kansas City Federal Reserve Bank.

The worst enemy the motor truck has in all this great territory is the careless, thoughtless and unreasonable dealer who sells trucks to persons who were able to make only a small cash payment and expected the banks to carry a series of notes covering a long period with the idea of paying them out of the earnings of the truck. In many cases the truck has been able to carry the burden but in more it hasn't and the banks have been the sufferers.

Should Push Truck Sales

The indifference of the dealers to the market that is open to them is amazing. They still are trying to push sales of passenger cars when they know there is no credit to finance them but it seems never to have occurred to many of them that they can sell trucks. They admit they are not selling many cars, but when asked if they are pushing truck sales, shrug their shoulders and say:

"If they want to buy trucks we have them. All they have to do is to come in. We'll be glad to sell."

These three states have had wonderful crops. The farmers don't attribute this happy condition to Providence but to tractors. They say that tractor drawn plows dug so deep into the fertile soil they couldn't fail to have bumper crops. With power machinery they were able to plow and plant early when the soil still was wet and when horses could not have dragged the plows.

While the territory has many dealers who have failed to grasp the opportunity which is theirs, there are many others who are fully alive to the possibilities. They are the ones who sell not only passenger cars but trucks, tractors, lighting plants and all kinds of power machinery. These men are wonderfully prosperous for most of the farmers have plenty of money or will have when their crops are sold.

Passenger Cars Selling Good

Though the banks are not financing sales of passenger cars it must not be assumed there is no market for them in this territory. There are many prosperous farmers who are buying for cash and they are getting more expensive cars each year. Thousands of them are driving Paige-Detroits, Hudsons, Nashes, Hupmobiles, and there are many Cadillacs to be seen.

Inadequate railroad transportation is slowing up the financing of the crops. Much of that grown last year is still in the warehouses. To meet this condition bankers are urging the purchase of trucks so grain can be hauled to distant elevators which will be able to receive it.



This may, at first glance, look like a hopeless task for the sheet metal man, but it was restored to its original shape with hardly a trace of ever having been damaged.

SHEET metal restoration service is in a field by itself. It occupies just as important a place as does either the electrical, the mechanical or the automotive fields. And it means just as much to the car owner.

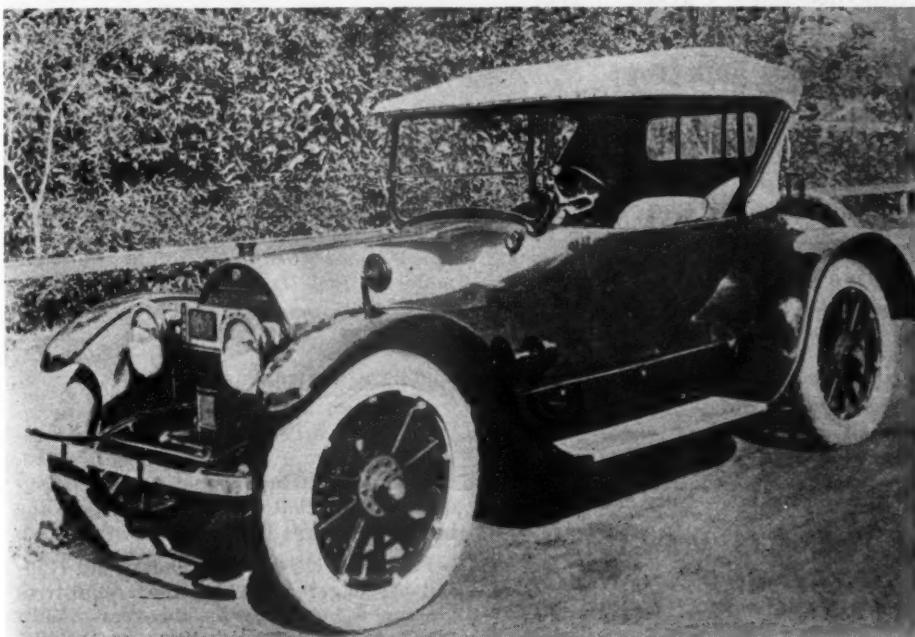
About the first thought that occurs to the man who has just wrecked his car is service. Aside from getting the wreck home he is vitally concerned as to how much salvage there is and assuming that the chassis proper has not been damaged to any great extent whereas the body looks like a total loss, the owner reasons that he must either have a new body complete or else buy a new machine. In either case a sizeable expenditure confronts him.

Save Owner Needless Expense

In past days the owner would have had a new car if not a new body. But today, badly as the old one may be battered and regardless of how useless it may seem, sheet metal experts will restore that damaged body and make it look as good as new at considerably less than the cost of a new one.



Here is what the two sheet metal workers gazed upon when called to the scene—



—and here is what the owner saw when they had completed their task of restoration

Don't Send the Damaged Parts to the Junk Pile

These pictures show what can be done in

Sheet Metal Restoration Service

A striking illustration of what has been accomplished by Tucker & Bonner, sheet metal workers in Hartford, Conn., is obvious from the following: An insurance company had a risk on an eight-cylinder runabout of good make. This car was pushed through a stone wall, rubbed noses with a sturdy tree and finally ended up in the lot with the body reduced to wreckage. The chassis proper came out of it lucky.

Pleased the Insurance People

The insurance company took over the car and requested an opinion from Tucker & Bonner as to the probable salvage. Two photos of the wreck were shown the sheet metal workers. "We can make it as good as new," said the metal workers. They took the car in hand and when it emerged from the paint shop who would know that it had ever been wrecked. The insurance people were pleased. The salvaged car is running to-day, just as good as ever.

This same company later had another

Concluded on page 27



Front view of the Manasquan Garage and Service Station, in Manasquan, N. J., a little borough containing 1,700 inhabitants.

The owners of this garage rent out two six-room apartments on the second floor of this building, which is 50 by 118 feet

PLENTY OF MONEY

In the Small Town Garage Business If You Go After It in a Logical Way Like These Men

HERE is how two partners are making good with a sales and service business in a New Jersey borough of only 1,700 inhabitants.

It shows what two men with a lot of grit and initiative can accomplish in a small town service station.

Not long ago, H. D. Meeker and D. L. Higley, of Monmouth county, New Jersey, famous alike for its potatoes and the number of prosperous garages, picked the little borough of Manasquan as the place in which to sell their

So it was without any qualms that the two young men decided to set up in business. They looked about and selected for themselves a building 50 by 118 ft. and two and a half stories high. They called it the Manasquan Garage and Service Station.

It was comparatively new and had a drab terra cotta exterior. The upper part of this building the partners turned into two large and attractive apartments of six rooms each, to rent.

Installed Real Equipment

Of the lower floor they made a sales, service and repair station, equipped to do considerably more business than was immediately in sight. They had looked over the field and were aware of its possibilities of development. Supplied with two very large entrances—one in front and the other at the side, and two spacious show windows, the building, with its big yellow gasoline pumps in front; its large, well-designed signs and its ornamental balconies at windows of the second floor presented a decidedly attractive appearance. The partners were well satisfied with the outward physical start of their business.

mechanical and merchandising ability in the automotive field. They saw the money-making possibilities in a rightly conducted service station.

BOTH were better mechanics than salesmen, but in Manasquan one soon becomes accustomed to selling—for during three months of the year its population is considerably swelled by easy-going seashore bungalow colonists, most of whom have their own cars and use them daily over the inviting stretches of country thereabouts.

Inside, they had a deep pit in the workshop in which to work at ease on the underparts of cars and trucks, for theirs was to be a combination passenger and commercial service station. As in most small towns, the term "garage" was intended by the partners to cover a great deal outside of the strict meaning of the word. They put in thoroughly modern work benches—three of them—equipped with vises, locked drawers and complete kits of small tools. The benches, placed directly beneath large windows, permitted daylight work up to the last possible moment and from swing-arms above each bench was suspended a shaded electric lamp.

Equip a Service Car

Small, portable electric drills were installed and other machines for light repairs; a motor stand, a chain hoist, reamers and scrapers and the usual lay-out for shop that does not undertake the heaviest work.

For a service car they had an old Hudson passenger car which they rebuilt replacing a box body on the rear. With jacks, crowbar, towing line and the like and the small chain hoist mounted on the

What Two Partners Are Doing In a Little Town

*Conducting a garage.
Doing general automobile and truck repairs.*

Running a tire repair and vulcanizing department.

Repairing and recharging batteries.

Selling oil, gasoline, automotive equipment, tires, tubes and spare parts for automobiles and trucks.

Acting as agents for a farm tractor and an electric battery.

THERE IS MONEY IN A SMALL TOWN GARAGE BUSINESS—GO AFTER IT.

rear, they were ready as a wrecking crew for the worst jam on the Manasquan pike.

"We get 'em, once in a while, too," says Higley, "especially in August, when the city tourists get thick on the roads."

Doping it out that the bulk of their business must be done in three months—the period of the bungalow colonists—the young partners realized that they must do as intensive and comprehensive a business as possible.

Owners Seek Best Shop

Now it was characteristic of the pair that they had not tried, in setting up shop, to corner any particular territory. They preferred to see what they could get where the traffic was thickest. Accordingly, the spot they chose was adjacent to the public square on Main street. One can toss a stone from the center of this square and hit any of four other garages and repairshops.

"People like to shop around for automotive repairs, you see," explains

Meeker, "and this is now a sort of shopping center. We get ours, too."

Their repair shop proper is 50 by 20 ft. It is reached either directly, through the side entrance, or the main entrance through the large central space used as the car storage hall.

They Add a Tire Department

The partners started with repairs, storage, of both passenger and commercial cars and the renting of their two apartments above. Business prospered and they decided it would be best to add a stock of parts to complete their service station plan, rather than to buy just what was needed by a customer, "on demand." This worked out well and saved time, as well as assuring sales in about eight cases out of ten.

Next, the proposition of handling a stock of general automotive equipment was considered carefully and soon undertaken, with good results.

"Ought to keep tires, if only as a matter of accommodation to our growing list of customers," suggested Meeker.

"Yes, and we ought to do tire repairing and vulcanizing to keep our customers' tires in proper condition," said Higley. "Our competitors are doing it."

They set aside and partitioned off an accessory department and office; 20 ft. square, put in a good stock of tires and accessories, with racks, bins, showcases and a counter. Business warranted it. The bulk of the tires they placed in a rack just above the automotive equipment shelves and bins. Tubes they kept on convenient shelves behind the counter, neatly arranging the cartons. A small counter showcase added greatly to the appearance of the office.

Carry \$2000 Accessory Stock

They now carry \$2,000 worth of tire and accessory stocks, and turn it over very quickly. Part of this success they attribute to their reputation as good workmen and obliging salesmen; part of it to their location on the public square and the rest to small, but regular newspaper display advertising, inserted in the more important dailies of the county.

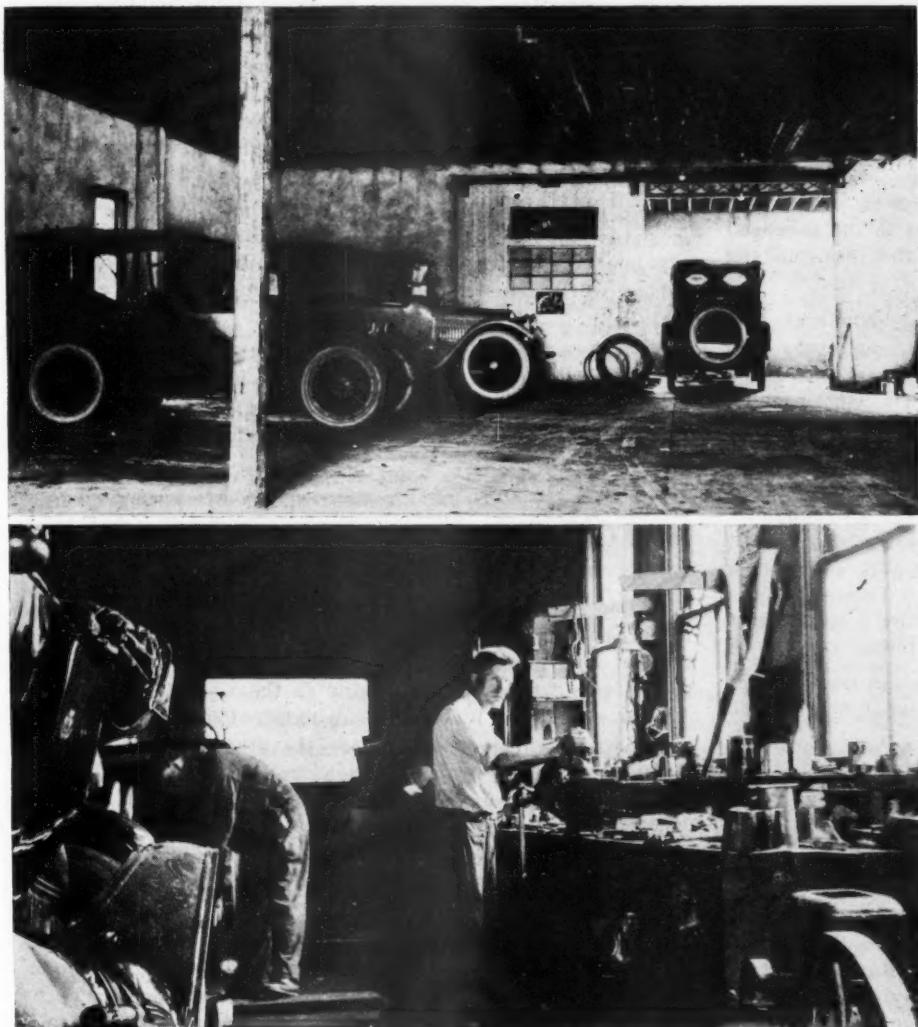
Tired of telling customers who inquired where they could buy electric batteries or have them recharged, that they could be accommodated across the street or three doors below, they decided that, in self-defense, they would have to put in a battery sales and service department. They did. They obtained the agency for Ever-Ready batteries and installed a recharging system to take care of fifteen batteries simultaneously.

Saw Tractor Possibilities

But this year the farm tractor idea is spreading through Monmouth county. And while there are many tractors thereabouts, both large and small, the farmers complain that they get little in the way of service when they cast a lug, or something blows out or breaks. They are stranded in the field, till they can make a trip to town and purchase what they need. Then they must go back and tinker, or stand the expense of having a tractor man come and fix things.

So Meeker and Higley have taken the agency for the Do-It-All tractor, made in Buffalo, N. Y., and have expressed their intention of carrying about \$3,000 in tractor stock and parts. They will give service to the farmers by means of their rebuilt Hudson car, with its box body, its tool kit and its small crane with chain hoist.

Are the two young partners busy? Ask them. Do they deserve to be? Ask their satisfied customers. Others could win equal success in their own town if they would go after the business in the same thorough manner.



Top—View in the car storage portion of the Manasquan Garage and Service Station. The repairshop is in the rear, through the door where the automobile is passing out

Glimpse of the repairshop, 50 ft. by 20 ft., in the Manasquan Garage and Service Station. Note the completely equipped workbenches with locking drawers, and the daylight facilities

LEAKS!

There are a half-dozen ideas on Pages 8 and 9 showing how service losses may be checked. These small losses may seem harmless when viewed separately but multiply them by the days in a year and they are staggering. Turn to Pages 8 and 9.



KEEPING SHOP EXPENSES DOWN

interviewing dealers in various towns this question is invariably raised. We have heard the statement a number of times, "I am trying to get rid of the service end of my business, it costs too much to run it. Further, in keeping with the amount of work necessary to run it and the returns, it is felt our company would make more money by devoting the time spent on service to some other branch."

Other dealers have told us that they passed a similar period in their business but when the difficulties were surmounted the viewpoint was changed. In practically every case we find the change of viewpoint was brought about by the reduction of shop expense.

This is an item often classed as overhead. But were such things as small tool breakage, gasoline used for cleaning, cleaning cloths, and other small items which on the surface appear insignificant, listed as separate items in the overhead it would readily become apparent where the leaks in the service business are.

One dealer we know who has been using something like fifteen gallons of gasoline a week for cleaning parts was able to reduce this amount by half, by furnishing bristle brushes to the men for use in cleaning the parts. The cloths which had been used previously absorbed a good deal of the gasoline and considerable was wasted through splashing, all of which was eliminated by the use of brushes.

The item of small tool breakage is one that also amounts up. Testing generators and storage batteries with small lights is another wasteful process. The lights very often burn out and are broken through jarring. Another dealer had in mind saved fifty dollars in a month by more careful attention to such a small item as cleaning cloths.

We repeat again that these small items seem insignificant but in the aggregate it is found that the small items are the holes through which the profits leak.



ROAD BUILDING WITH FEDERAL AID

a piece of road of a certain type and length in a certain location.

This notice, known as a "project statement," is accompanied by an estimate of cost. The project statement is examined by the district engineer to determine whether the project complies with the Federal-aid road act. If his de-

EDITORIAL



cision is favorable he forwards the statement to the Washington office with his recommendation.

There it is examined by the chief engineer and his assistants, and if the latter concurs in the recommendation of the district engineer the project is placed before the Secretary of Agriculture for his approval. Until the Secretary has acted, no further action is taken by the State.

Over half of the projects handled are passed by district officers in an average of five days—an illustration of the manner in which work can be expedited even where a large organization and complex procedure are involved.

Up to June 30, 1920, 2985 projects involving a total of 29,319 miles of road had been approved by the Secretary of Agriculture. The preliminary estimate of the cost of these projects is approximately \$384,900,000, of which approximately \$163,841,000 will be approved as Federal aid.

On the same date 2116 projects representing approximately 15,944 miles had either been completed or were under construction. The estimated total cost of these projects in various stages of construction and completed, is \$200,000,000.

The total cost of Federal-aid work approved by the Secretary in the nineteen months subsequent to the signing of the armistice, and prior to July 1, 1920, which is approximately \$330,000,000, exceeded by \$63,000,000 the cost of all road and bridge work done by States and counties in this country in 1915.



PREACHING THE VALUE OF MOTOR TRUCKS

REPORTS from all sources indicate that the harvest has been unusually heavy. In fact, this year farmers state that many years have passed since a crop equally heavy has been harvested. The sad thing about the whole affair is that transportation facilities will not permit the crop to be moved from the farm. Farmers shake their heads sadly and remark that if only some means were available to move the crop to market, it would mean a great thing to them.

So it would, and it would mean more. Prices as a general rule will be affected one way or the other depending upon whether or not the crop is brought to market.

There is a means available to reap the harvest reward. The answer is in the motor truck.

Sufficient trucks are available to move the crop, but bankers are reluctant to produce the wherewithal to finance the truck deal.

Now it is a question of saving the crops. Is it fair to the rest of the inhabitants of this country of ours to let the crops go to waste? Of course not. And the only thing that will prevail upon banking interests to further the crop movement is preaching. If we all start preaching about something that we all know ought to be done and that we all agree as to how it ought to be done, we can get somewhere. So we propose a preaching campaign emphasizing the absolute need of motor trucks to the farmer, the producer, the city man, the consumer and to every one else.

Increased August Production

Factory Figures on Passenger Cars and Trucks Better Than Those of July 12. Several Plants Show Material Improvement. Ford Output Helps Situation

DETROIT, Sept. 10.—Passenger car production in automobile factories in Detroit territory totaled 150,573 in August as compared with 147,299 in July. Truck production also showed an increase of close to 3000, the August production reaching 18,080 as against 15,068 in July.

The output of trucks by the Ford Motor Co. alone prevented a much poorer showing for August, Ford's total being 12,368 compared with 9251 in July. The

BUICK officials declared the industry already was beginning to recover from the set-back as indicated by increased specifications and estimates from dealers. Buick orders and estimates, they said, justified the production increase of 2000 cars in August and September, they say, is expected to show an even better percentage increase.

Ford, with a production of 83,556 cars, increased his July total by only 294 cars, while the Dodge August figures show an increase of 1000.

Ford factories during the coming fiscal year will be devoted to reaching a production of 1,225,000 cars, necessitating a daily output of over 4000. The factory got away to a good start, and as yet has not fallen below the 4000 mark since Sept. 1. On Sept. 3, 4116 cars were built, 4239 on Sept. 4 and 4179 Sept. 5. In addition to the greatly increased car and truck output the Ford factory turned out 10,387 tractors in August.

Reo Has Record Output

Reo Motor Car Co. hung up a record with the August production, the factory turning out 1315 cars and 2000 trucks. The truck record was an increase of approximately 1000 over July.

In the truck end, General Motors, at Pontiac, Packard and Federal showed an increased production in August. With the other factories, however, there was a slackness. Republic, which closed down during the last ten days of August, built only 340 trucks as compared with 1240 in July. Oldsmobile truck output was 200 under July, while the Paige output was cut one-half. Denby and Acme also slowed down in August production, as did Transport.

In the passenger car end the Hupp Motor Car Corp. forged to the front as the leader in point of increased production, with an output of 2270 cars in August compared with 1500 in July.

Buick and Studebaker factories have settled down to a steady production on

Ford increase of 3117 more than offsets the deficit shown in the month's production in other factories.

IN THE face of reports that the industry had been hard hit by the tightening of the money market, and other retarding factors, several of the plants showed material increases in production during August. This applies not only to cheaper cars but to the higher priced vehicles as well.

BUICK officials declared the industry already was beginning to recover from the set-back as indicated by increased specifications and estimates from dealers. Buick orders and estimates, they said, justified the production increase of 2000 cars in August and September, they say, is expected to show an even better percentage increase.

Ford, with a production of 83,556 cars, increased his July total by only 294 cars, while the Dodge August figures show an increase of 1000.

Ford factories during the coming fiscal year will be devoted to reaching a production of 1,225,000 cars, necessitating a daily output of over 4000. The factory got away to a good start, and as yet has not fallen below the 4000 mark since Sept. 1. On Sept. 3, 4116 cars were built, 4239 on Sept. 4 and 4179 Sept. 5. In addition to the greatly increased car and truck output the Ford factory turned out 10,387 tractors in August.

Money Available for Good Risks

Hudson-Essex production was cut materially in August, the decrease, as compared with July, ranging around 1300 cars, in the Essex end. Liberty and Columbia ran close to normal, Scripps-Booth reported an increase of 200 over July, and King was cut about 25 per cent. Oldsmobile production also was off about 25 per cent and no cars were built at the Nelson plant which will be out of production until November 1.

Bankers in Detroit, as well as those in nearly all sections of the country, according to reports of dealers, are showing an inclination to take care of all good risks, and no dealer who is financially sound is being hampered to any extent by tight money conditions.

In this connection an address was delivered at a convention of 400 Ford dealers, representing the Detroit district, which includes parts of Ohio and Indiana, by W. A. Perry, a leading banker of Kansas City. Coming directly from the section where the talk of depression started, and where the order eliminating, or at least curtailing automobile loans, first was issued, the remarks of Mr. Perry had a most enervating effect.

He said the bankers had been, and at all times could be, willing to take care

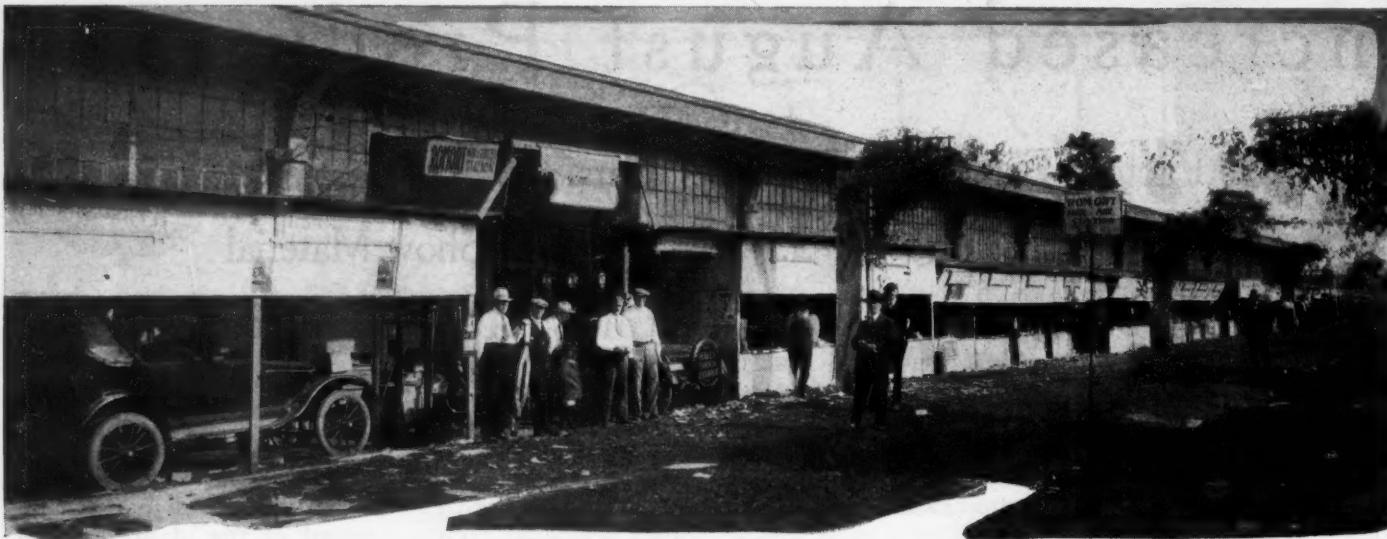
of good men, realizing that the automobile, as well as the truck and tractor, were absolute essentials. Mr. Perry said it was the most natural course for banks to pursue, to frown upon the long-time installment plan of selling cars to persons not financially able to handle them, the dealers themselves unable to finance the deal, and the banks in consequence called upon to tie up immense sums. Similar statements are reported from a Ford dealer convention at Milwaukee where 300 Ford dealers convened with 100 bankers from all over the state as their guests.

The bankers are quoted as reporting conditions much easier with banks big and little, ready to finance any safe dealer risk. They said there was plenty of money for use of the farmers with which to finance truck and tractor purchases, it being the determination of the bankers to urge upon them the advisability of using motor trucks and motor machinery on the farm.

Reorganize Maxwell-Chalmers

Aside from Maxwell-Chalmers, Commerce Motor Car Co., Republic Truck and the Nelson Motor Car Co., all of the factories in Detroit territory are working steadily, except in one or two instances where working forces have been cut materially, and production curtailed accordingly. This applies particularly to the Hudson-Essex factory in Detroit and the Overland plant in Toledo. At the latter factory the five-day week, with a curtailed crew of employees still is in vogue. Commerce Motor Car Co. has been down since the middle of July and officials are not ready to announce when production again will be started.

Republic Truck Co. expects to resume production about Sept. 15. Resumption of production at Maxwell-Chalmers is a question that rests entirely with the managing committee in charge of the re-financing plan, and Walter Chrysler, who is conducting the reorganization



View of automotive section of State Fair at Milwaukee, showing permanent building in which the dealers held interesting exhibits

Dealers Build Village at State Fair

Trucktown Established in Milwaukee By Motor Truck Division, on Account of Demand for Space, With Streets, Stores and Business Blocks—Approximately 60,000 Visitors Pass Through Miniature City

MILWAUKEE, Sept. 10—The Milwaukee Automotive Dealers' Association, through its motor truck division, introduced a brand new idea in motor truck merchandising by collective exposition at the Wisconsin State Fair this year. It consisted, in short, of establishing a transportation village called Trucktown which was laid out in streets flanked by stores, one for each dealer. The miniature city was walled in, but without roof, and admission was free to all.

This departure from the accepted ideas of showing

FIVE years ago, the Milwaukee dealers' association staged its first formal fall show at the State Fair grounds, having succeeded in inducing the State Fair management to turn over what was then known as Machinery Hall for a collective exposition of passenger and commercial cars and equipment. Machinery Hall was nothing more or less than a gaunt concrete roof supported by concrete pillars arising out of a solid concrete floor. It was originally designed for general display of farm equipment. The Milwaukee dealers at their own expense walled in the sides and ends with steel sash, gave the interior a coat of paint, and in a

motor trucks in much the same manner as passenger cars usually are exhibited was made necessary by two problems confronting the Milwaukee dealers.

ONE was the problem of finding adequate facilities for housing the motor truck department of the annual fall show. The other was to find some new and novel way of attracting attention to the motor truck at a time when intensive cultivation of interest is probably more necessary than ever before to maintain a rising sales curve.

jiffy they found themselves with a mammoth fireproof exposition hall, admirably suited to the display of motor vehicles and equipment. The legend, "Machinery Hall," on the front and sides of the building, was erased and the word, "Automobiles," placed there instead.

In 1916 the building proved insufficient and a small circus tent was erected at one side of the show building to hold the overflow of truck displays. In 1917, a larger tent was necessary, and in 1918 another canvas addition has to be made, while last year the number of exhibits was so large that the tented additions more than equalled the area of the permanent exposition hall.



The back yard of Trucktown, showing one of the frequent parades of trucks and trailers on the move. The tent in the background was used for motion pictures of highway transport tours



The portable buildings which formed the "business houses" of Trucktown. There was also a Motorize-the-Farm booth where attractive literature was distributed selling farmers on the value of the truck for farming

Despite vigorous efforts to get an appropriation to build an addition, wartime conditions made it impossible to achieve the desire in time for this year's fair. So the dealers' association did the next best thing and secured the concession of five acres of ground adjacent to the permanent building and staged "Trucktown." For one thing, this obviated the use of large circus tents, which were hard to obtain and to manage. And as no city has a roof, so it was deemed best to leave off the big top so that Trucktown would resemble a village in fact as well as name.

Lay Out Village

The five-acre tract was divided off into a village and a demonstration field. The village was laid out in streets, and thirty temporary buildings, built of wall-board and lumber, were stationed along the streets as the business home of each exhibitor. On the main thoroughfare between the permanent show hall and Trucktown, a long row of small booths to accommodate the overflow of automotive equipment exhibits was erected. These displays referred mainly to commercial car needs.

The truck displays occupied all of the space between the "streets" and surrounded each of the portable business blocks. At one end a section was set aside for trailers. Behind the village a large area of pasture was plowed up for a demonstration field, so that any prospective buyer might be shown at a moment's notice what a certain make of truck or truck-trailer combination could do under extreme conditions.

According to custom, the regular admission of 10c was charged for viewing

the passenger car and equipment displays within the permanent building, but Trucktown was free to all. The two displays were connected, but each had its own entrances. No admission was charged to the truck show, for the obvious reason that the dealers were particularly anxious that the greatest number of people possible could see the display with the least resistance. At the same time, the passenger car show, having built up a dignity substantiating an admission charge, was continued on the former basis, and the attendance was limited to those who were interested enough to pay a dime. Even so the permanent building was jammed daily.

The permanent building had its own orchestra and Trucktown had its own brass band to lend a harmonious touch to the constant rumble of operating trucks. Impromptu parades of trucks were held every afternoon, the line of

march being from Trucktown to a distant point on the fair grounds and return. Inside, there was constant action, trucks passing in review at all hours, going from place to place, or to the demonstration field and back to the station. Motor buses were on the go all day long.

Open Day and Evening

Like the fair proper, the passenger and commercial car shows were open day and evening. Trucktown was a well-lighted community, high powered lamps being strung along all streets and lighting service being given every booth. Night visitors were given the same attention as those who came in the daytime. In fact, the report of exhibitors is that more bona-fide prospects came in during the evenings than in daylight, probably because the pressure of the crowds was lessened after nightfall, enabling pros-

(Concluded on page 39)



View of the entrance to Trucktown. No admission was charged and about 60,000 people were shown the value of the truck and its great future

Proper Business Plane Is Not Yet Reached by Many Dealers

Show Managers Discuss Trade Situation and Adopt Resolutions Looking Toward Improvement

CHICAGO, Sept. 9—Expressing confidence in the immediate future of the automotive business, the show and association managers of the country closed a two-day session at the Congress Hotel to-day. At this session they discussed plans for greater and better shows this year, for more extensive association work, for the stimulation of business and an acceleration of the back-to-normal trade movement.

It was a special meeting of the National Association of Automobile Show and Association Managers. Managers were present from distant points, including Texas, Florida and New England, and a list of large and small city and state organizations.

Energetic Effort Needed

It was the first session held under the enlarged plan of the association, in which other than show management is included. The first day was devoted to show matters and the second day to association management.

At the close of the meeting the managers adopted a resolution expressive of their confidence in the automobile business, emphasizing its essential character and setting forth their view that an energetic business effort during the fall and winter months will aid materially in a return to active business.

The situation to-day was likened to that existing at the signing of the armistice. At that time the motor car business had nearly stopped, as regards both manufacture and sales. In that critical moment the show managers met in Cleveland, crystallized sentiment as to an immediate onward movement and started the motor car business going at a rapid rate inside of sixty days.

It is the belief of the managers that similar methods at this time will bring business back to the dealers in good volume this winter and give the spring season a good start.

Many Dealers on Wrong Basis

One of the strongest messages at this meeting came from F. E. Moskovics, vice-president of the Nordyke & Marmon Co., Indianapolis. Mr. Moskovics, who has just completed an investigating tour of the country, to the Pacific Coast and back, told of conditions as he found them and predicted a good future for the business. He said there is nothing the matter with the automobile business, that the demand still exists but that a variety of conditions have caused a temporary halt.

He declared it his opinion that many dealers have yet to reach the proper business plane, that many do not under-

stand the financing of business, that accounting and cost methods are not universally up to par and that the strongly organized dealer is suffering hardly at all, even with the restrictions that have been imposed upon business during the past summer.

Better local co-operation was another thing urged. Mr. Moskovics said dealers are often prone to make derogatory remarks about competitors. He said a present day story current is that "so and so has so many cars in the warehouse and can't remove them." He said he added the figures given him in one city and found it totaled 875,000 cars, which is more than there are in that state and several neighbor states combined.

Mr. Moskovics also urged a closer relation between dealer associations and the

How Louisiana Dealer Gets Salesmen

A new and novel method of developing a sales force in the South has been inaugurated by the City Sales Agency of New Orleans, distributors of International motor Trucks and Lee bodies and trailers.

This agency is taking a limited number of bright and ambitious boys, preferably those whose parents are not in such financial condition as to provide them with technical educations and are paying them while they learn all departments of the business of selling passenger cars, trucks and tractors. It believes that in taking the prospective salesman while he is young and training him in the way he should go it will provide itself with the best corps of executives and salesmen.

The agency is attracting the attention of boys and parents alike by an advertisement which is being used to advantage in the Bulletin of the Association of Commerce. While the advertisement calls for only one or two boys it is understood that the agency will gradually accumulate ten or twelve, giving each applicant an unbiased chance to show his ability and retaining those who show ambition, willingness and industry.

manufacturers, and later in the session the association managers adopted a resolution addressed to the National Automobile Chamber of Commerce, expressing the desire of the association men to work in closer co-operation with the N. A. C. C. and its members.

Deliver Interesting Talks

Valuable advice on association management was contributed by Commissioner William M. Webster of the Auto-

Good Outlook for Tire Sales by Dealers Seen by Manufacturers

Overstocking Due to Various Reasons Has Caused Fall in Sales—Replenishment Necessary

AKRON, Ohio, Sept. 10—Sales of automobile tires by manufacturers to dealers were below normal during June, July and August, due to the fact that last Fall and Winter dealers stocked up very heavily and the severity of the Winter in many sections of the country retarded sales by reducing the use of cars. Another factor in the overstocking with the dealers was their heavy buying during the winter in anticipation of an increase in price during the Spring months.

With the manufacturers the impression prevails, based on reports from agencies, that these stocks are now gradually moving and, except in cases where dealers stocked too heavily, the time is at hand when they will require replenishment to meet the consumer demand.

Future Sales Outlook Good

In this connection the manufacturers are of the opinion that the outlook for sales, both by dealers and manufacturers, should be good, especially in the next four months, for the reason that September, October and a part of November represent a fair per cent of the automobile season. One of the largest manufacturer's reports that while collections from charge customers by tire dealers have been slow they have not been in greater proportion than is experienced by dealers in other commodities.

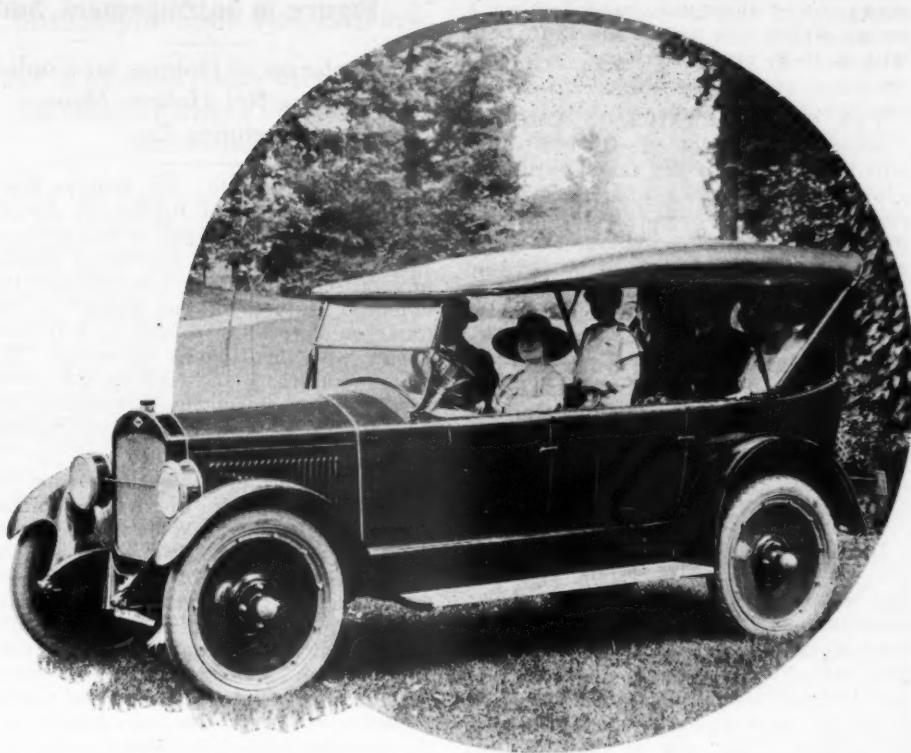
Local interest in tire production has been aroused by statements that the Ford Motor Co. would require tires for 1,250,000 cars in 1921, and that the General Motors Corp. is preparing for a greater volume of sales in 1921 than handled in the present year. Local manufacturers, while refusing to make predictions, are nevertheless optimistic about the business ahead and are making steady progress in their readjustment programs. business manager of the Chicago Association of Commerce.

motive Equipment Association. What a chamber of commerce expects of a trade association was told by Robert B. Beach,

The association, as shown by the report of Executive Secretary Ray W. Sherman, has, under its recently adopted plan of reorganization, a growing treasury and a substantial membership.

Wednesday evening the managers were guests of the Chicago Automobile Trade Association at a dinner at the Chicago Automobile Club, presided over by Harry Branstetter, a director of the Chicago association, and Timothy D. Beard, its manager.

The New Sheridan Four-Cylinder Open Model



This model went into production at the plant of the Sheridan Motor Car Co., in Muncie, Ind., shortly before Sept. 1. Other models will follow soon. The Sheridan line consists of four and eight-cylinder types with five and seven-passenger open and sedan models, also roadsters and coupes. A complete description of the line will be published in MOTOR AGE at an early date.

Dealers Association Approves Plan Against Over-production

N. A. D. A. Also Takes Up Matter of Refinancing Organization for Next Three Years

CHICAGO, Sept. 10—Distributors from half the states in the Union, at an emergency meeting of the National Automobile Dealers association here to-day, pooled their information and took action for the furtherance of business stability during the coming winter.

The most important act was a telegram to the National Automobile Chamber of Commerce, setting forth conditions and asking that all car makers do as some have already done and bring their production down to the sales possibilities of the coming months. In practically every section there is a 60 days' supply of cars on hand now and winter will not materially improve the situation. It is the belief of the distributors, as set forth in the telegram, that their business is sound, and there is no occasion for great alarm but that if production and sales possibilities are evened up this winter it will leave the way open for a wonderful spring business.

The pooling of information further emphasized the more or less well known fact that the dealers in the larger cities are being taken care of by the banks

but that the small town dealers cannot get the necessary credit.

Another important act was a refinancing of the N. A. D. A. It is proposed to raise \$100,000 a year for the next three years. This will be done by \$100 memberships from distributors, in addition to the regular \$10 memberships from dealers. Dealers can take the \$100 sustaining memberships also if they so desire. The campaign, however, will be made among the 2500 distributors in the country. Pledges made at the meeting netted \$10,000 a year for the three year pledge period, and this represents only a small percentage of the distributors. A resolution was adopted that the dealers prefer a sales tax in place of the present excess profits tax, which prevents a man from putting the earnings of his business back into his business.

Now a Buyer's Market

A favorable response was made to an inquiry from a manufacturer as to the dealers' attitude regarding widespread advertising by the N. A. C. C. regarding the essential character of the industry and similar matters.

The telegram to the N. A. C. C. regarding conditions follows:

"Motor car distributors from 23 states summoned by wire to discuss the motor car situation were of the almost unanimous belief that our business is in a safe condition, but that we are in a buyer's market and experiencing critical financial conditions. It was decided the association would wage a general

campaign, urging all dealers to secure better business, more working capital, and more extensive sales efforts. Banks in some sections are discriminating and in practically every section money is tight. Winter stocking of cars will be difficult.

"We approve the plan of some of the manufacturers to keep production within the limits of sales possibilities, and recommend other manufacturers take similar action."

Haltenberger Leaves Briscoe; Other Changes Thought Likely

Induction of New President of Corporation Followed by Resignation of Chief Engineer

DETROIT, Sept. 10—Announcement of the resignation of Jules Haltenberger, chief engineer of the Briscoe Motor Corp., effective Oct. 1, is believed to be the forerunner of a clean sweep to be made in the organization as a result of the induction of H. F. Wardwell as president. The information regarding Haltenberger's resignation was given out by him and confirmed by factory executives, who said the announcement was premature and that it had been intended to withhold it pending the appointment of a successor who has not been selected.

Haltenberger has been with Briscoe the last five years and is the designer of the new Briscoe, the model first shown at the New York show in January. Haltenberger would make no statement regarding the reason for his resignation and declared he had no plans for the immediate future.

W. G. Zeby Made Traffic Manager

At the factory it was said President Wardwell had entered the organization with the determination to delve deeply into all conditions effecting the plant and make whatever changes were deemed necessary. It was said other changes in the organization doubtless would be announced from time to time, though nothing had been decided definitely along that line. In line with Mr. Wardwell's plans, W. G. Zeby, formerly connected with the Chicago office of the Michigan Central Railway, has been made traffic manager of the Briscoe organization and has assumed his duties at the plant.

GASOLINE SUPPLY NORMAL AGAIN

NEW YORK, Sept. 11.—The gasoline supply throughout the country now is normal, according to reports received by the directors of the National Automobile Chamber of Commerce here yesterday. This is true even on the Pacific coast where there was a serious shortage for sixty days. While the supplies are adequate to meet the needs, the prices are higher and in many sections are tending higher than they have been. In some instances the higher cost is attributed to increased freight rates.

Production of R. & V. Co. Not Affected by Sale to Moline Plow

Engines for Stephens Will Be Made in Department Sold—More Knight Cars

MOLINE, Ill., Sept. 11.—Sale of engine manufacturing facilities of the Root & Vandervoort Engineering Co. to the Moline Plow will not affect production of the plant, according to officials of both companies. Engines for the Stephens car will continue to be produced in the engine department sold to the plow company while the R. & V. interests plan extension of production of the R. & V. Knight car in greatly increased numbers. Before the separation and sale of the plant, the R. & V. people under contract supplied the Moline plow with engines for its automobile and tractor implements.

Operation Continued Unchanged

Operation of the factory will continue as before except that the Moline Plow interests now own and control the department producing engines for their implements, instead of purchasing on contract. The R. & V.-Knight automobile will be manufactured by the original owners who retain interests in all Knight engines and automobiles.

Inventories and details of the separation of the plant are proceeding and will shortly be completed. Formal transfer will not be made until then, although to all practical purposes the division is complete.

18-FOOT HIGHWAYS IN NEVADA

Reno, Nev., Sept. 10.—Although the Federal Bureau of Public Roads had laid down the policy that it would aid no state in the construction of a highway less than 24 ft. in width, a new ruling has been made which will enable Nevada to construct 18-ft. highways in its mountain districts.

State Engineer C. C. Cottrell, in a conference with B. J. Finch, District Engineer for the Federal Bureau, showed the cost of building a 24-ft. road in the

mountain districts is almost prohibitive and upon his report to the Bureau, B. F. Hines, Chief Inspector, handed down a ruling which will permit the 18-ft. road with a 10-ft. gravel surface.

TAX OIL COMPANIES ON TANKS

ALBION, N. Y., Sept. 10.—Oil companies will be required to pay taxes on underground storage tanks at places where pumps for the sale of gasoline are located if the contention of the village assessors is upheld in a test case to be tried to determine the merits of the issue. The question has arisen in Orleans county in regard to the right of assessors to assess the tanks and pumps owned by the oil companies and leased to persons, firms and corporations to be installed for the purpose of the sale and delivery of gasoline.

NEW METAL RESISTS CORROSION

INDIANAPOLIS, Sept. 11.—A new metal alloy which resists corrosion by acids and alkaline solutions has been discovered and perfected by the metallurgical laboratory of the Midwest Engine Co. The new alloy has been named "Meco" and Midwest officials declare that it will resist all acids except nitric and almost all alkalis. They say it can be cast, rolled, welded or brazed without, it is claimed, offering difficulties common to other acid-resisting metals.

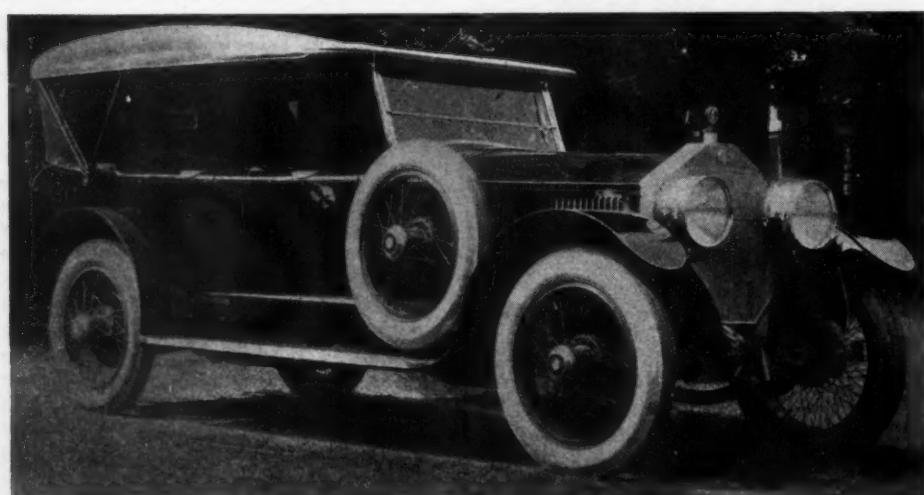
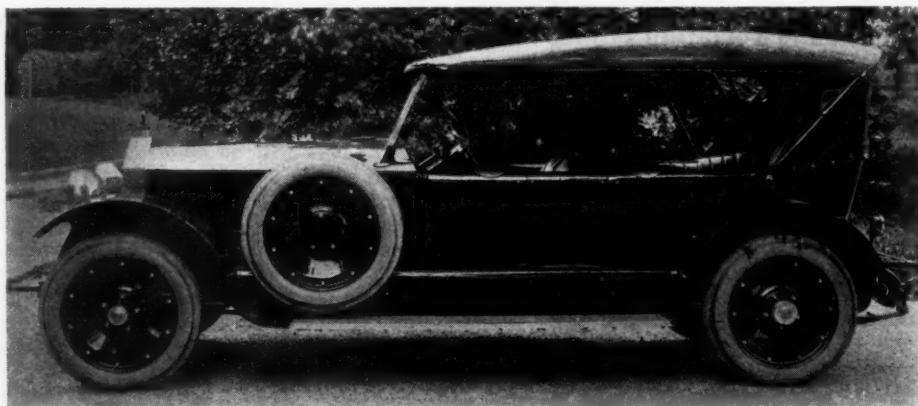
Holmes Company Does Not Figure in Infringement Suit

Manufacturers of Holmes Air-Cooled Cars Are Not Holmes Manufacturing Co.

CHICAGO, Sept. 10.—The Holmes Manufacturing Co. of Bridgeport, Conn., against whom an injunction was secured to prevent them from building or selling any air-cooled engine embodying the essential features of the product of the Cameron Motors Corp., is in no way connected with the Holmes Automobile Co., manufacturers of the Holmes air-cooled cars. The infringement in question has no connection with the cooling system used by the latter concern.

"The name Holmes Manufacturing Co. being so similar to the name Holmes Automobile Co.," says W. E. Butler, president of the Holmes Motor Car Co. of Chicago, distributors of Holmes automobiles, "and the fact that they were building an air-cooled engine, has undoubtedly led a great many people to believe that the Holmes Manufacturing Co. were building the Holmes 'air-cooled' automobile." The Holmes Automobile Co. has no knowledge of the Holmes Mfg. Co. against whom the injunction was issued and its system is fully protected by patents.

Two Distinctive Looking McFarlans Just Announced



The McFarlan Motor Corp., of Connersville, Ind., have just announced two new models: the touring type, 147 and the sport touring car type 145. Deliveries are just beginning on these cars. The chassis of 140 in. wheelbase is standard, and on it different bodies are mounted. The engine is a McFarlan twin-valve type having a bore and stroke of $4\frac{1}{4}$ by 6 in. Extremely large valves are used which give better volumetric efficiency and better economy. Two separate ignition systems are used on this car, a double magneto and a battery ignition unit. The car has a speed of from three to seventy-six m. p. h. in high gear.

Three Projects Completed in Mississippi Good Roads Work

Lack of Material Holds Up Louisiana Building—Parishes Provide for Maintenance

NEW ORLEANS, Sept. 9—With \$3,613,491 worth of road work under way and with approximately \$130,000 worth of this fully completed the Mississippi State Highway Department has issued a bulletin showing the status of federal aid road construction work as of Aug. 1, 1920. The report shows that there are three completed projects, one virtually completed, twenty-eight actively at work and three for which contracts have been let.

There are some projects which have not received federal aid because of technicalities in bond issues, surveys, or for other reasons which have not been cleared up but the state in the majority of instances is going ahead with work on these trusting to time and the courts to straighten out all tangles.

The majority of the roads now being built are of gravel surface construction with permanent drainage systems so that if in the future it is found necessary to change to rock foundation, concrete surfaced roads, the alterations can be made without interfering with the drainage structures. Two projects are being constructed of concrete, rock bottomed, 18 ft. wide with gutters on either side and with concrete bridges and conduits.

Louisiana Work Held Up

Much road building in the northern part of the Louisiana is held up by inability to get railroad cars for the transportation of gravel and by the shortage in the cement market. Many gravel pits have been closed except in three or four cases where lumber company branch railroads could handle the output or where motor trucks could be obtained.

The parishes of the state seem to have learned the lesson that it is of little use to put a lot of money into an improved highway and then to fail to provide funds to keep the highway in good condition. Three parishes, for example, recently voted favorably on the proposition to impose a tax for the maintenance of the roads.

RUBBER FIRM BRANCHES OUT

Welland, Ont., Sept. 10—Manufacture of hard rubber goods, plates and cells for batteries, etc., will be undertaken here by the Joseph Stokes Rubber Co. of Trenton, N. J., as soon as a plant under contemplation is erected. A three-acre site has been purchased adjoining the Grand Trunk Railway.

SCHOOL FOR MECHANICS TEACHERS

New Orleans, Sept. 9—The Isaac Delgado Trades School, a semi-public institution, will open night schools to educate teachers in motor mechanics so that they may take charge of this department

in other technical schools. This is the first school of the kind in the South and the opening is set for Oct. 1. In addition to complete instruction in automobile and mechanical equipment the teachers will have practical experience in teaching beginners in the automotive mechanical branches as soon as they have learned the first steps themselves.

ANOTHER RISE IN HARTFORD GAS

Hartford, Conn., Sept. 9—Gasoline has jumped another cent, the retail price among the members of the filler station association being 36 cents a gallon. Along

Dealer Capitalizes Bad Weather

George H. Thrall, general manager of the Thrall Motor Car Co., Kissel distributor in Hartford, Conn., believes in firmly convincing his prospects that what he says is so.

He had been working on a sedan prospect and it so happened that after the purchaser-to-be came into the salesroom a heavy downpour came on. Mr. Thrall lead his customer to the sedan and gave a demonstration in the rain.

The prospect who had never owned a closed car was fully convinced and he made the purchase then and there.

the country roads the fuel may be bought as low as 33 cents. Hartford owners find it hard to be reconciled with the increase inasmuch as there are three big refinery stations in the city. But the fact remains that motorists keep right on paying the price feeling that it is better to do this than to tie up their cars.

Will Preach Good Roads While on Business Tour

Kansas City, Mo., Sept. 10—The annual good roads and trade boosting tour of the Kansas City Motor Car Dealers Association will start from this city Oct. 4 and will include in its itinerary towns and cities of eastern Kansas and western Missouri. It will continue for six days.

More than forty passenger cars and trucks driven by the members of the association will participate. Particular attention will be given by the dealers to the coming selections when the question of issuing \$60,000,000 bonds for road improvement will be voted on in Missouri and 25 per cent state aid amendment, in Kansas.

Dealers Along Mexican Border Report Increased Call for Cars

Mexico Especially Good Field for Motor Trucks Due Chiefly to Railroad Shortage

LAREDO, TEX., Sept. 10—According to dealers here and at other border towns, business and industrial conditions in Mexico are much improved over what they have been for several years as shown by the increased demand for automobiles. While most of the deliveries are used cars, sales of new cars are being made under promise of delivery as quickly as possible.

It is stated by men who have investigated the possibilities of the country as a market for automobiles and motor trucks that it is a most inviting field. This is especially true as to motor trucks. In some instances the adoption of motor trucks by mining and industrial concerns have already solved local transportation problems but there are thousands of other plants which are in similar need of the vehicles. The lack of railroads accentuates the need of motor trucks.

Along with the improved business and industrial conditions comes the news from the City of Mexico that the government is having surveys made for a number of new and modern highways.

NEW HANSON PRICES ANNOUNCED

Atlanta, Ga., Sept. 10—at a meeting of Hanson distributors and dealers held at the factory here the Hanson Motor Co. announced the following price changes to take effect immediately:

Touring car and roadster.....	\$2365
Sport model	2465
Sedan	2885

The factory states that the new prices are made necessary by the new style body which has been adopted and the many refinements which have been added. The Hanson Six is now equipped with body, hood, fenders and all sheet metal parts of heavy gage aluminum.

SHOULD BACK GOOD ROADS

Wilkesbarre, Pa., Sept. 9—in a pointed talk, Robert Malone, representing the Overland Co., told a body of Overland salesmen from eleven counties how they might enlarge their selling capacities by laying the facts of the present automobile situation before their individual bankers. He said that six out of every ten gallons of gasoline purchased for passenger cars is used for business and that nearly every man who owns such a car devotes most of its use to business and business calls.

When the large sums already voted for road improvement have been actually expended, he said, the new roads will offer an ever increasing appeal to many persons who do not own cars at present and who then will become fair prospects. Therefore, he stated, automobile dealers and salesmen always should be behind movements for road betterment.

**Southern Finance Corp.
Formed by Georgia Men
With Capitalization of \$12,000,000
Company Will Handle Auto-
mobile Paper of Dealers**

ATLANTA, GA., Sept. 10—Expressing absolute confidence in the growth and development of the automobile business in the South and recognizing the automobile and motor truck as absolutely essential, a group of prominent business men of Georgia have organized the Southern Motor Finance Corp. with an authorized capital stock of \$12,000,000. Headquarters have been established in the heart of Atlanta's automobile row, and the company will handle automobile paper and finance dealers, charging the standard rates. It is one of the largest automobile finance corporations in the South.

Officers of the new corporation who are all representative and successful business men, are J. Mallory Hunt, president; C. Carroll Spear, vice-president; Norman T. Pool, secretary; F. A. Quillian, treasurer. The board of directors includes the officers and William Truax, Walter Hopkins and Frank R. North.

A similar company has lately been established at Birmingham, known as the Automobile Financing Corp. It is capitalized at \$50,000 and handles automobile and truck paper of all kinds at the standard rates of interest.

**Construction of Kleiber Truck
in Atlanta Will Begin This Year**

Atlanta, Ga., Sept. 10—Production of Kleiber trucks in six different sizes from one to five tons, will begin the latter part of this year in the company's new Atlanta factory, according to an announcement of A. Junge, sales manager for the Southern territory.

The building now under construction represents an investment of about \$100,000, and additional units to be constructed the early part of next year will cost an additional \$150,000. The truck has heretofore been manufactured exclusively in San Francisco, and the Atlanta factory is the first to be established east of the Mississippi river by the Kleiber Motor Truck Co.

Edward Kleiber will be general manager of the Atlanta branch, and Neil Burkness, chief engineer. Production for the first year is set at 800 trucks.

DEALERS CARRY GOOD REPORTS

Alma, Mich., Sept. 9—Republic Motor Truck Co.'s salesmen have held a two-day convention here looking over the factory and outlining plans for an intensive sales campaign for the ensuing year. The party, which was divided into two sections, came by way of Chicago and Detroit, special trains carrying them from those cities. The dealers reported the depression following the curtailment of credit some months ago was disappearing rapidly and that the normal de-

mand for trucks is expected soon. Estimates furnished factory officials by dealers who represent all sections of the country indicate that the year 1921 will be equal to 1920 in point of demand and with easing up in the money market no fear is felt but that truck factories will be able to dispose of their output.

WORCESTER DEALERS PLAN SHOW

Worcester, Mass., Sept. 2—Worcester dealers are planning for a show early in the fall at which nothing but closed car models will be exhibited, and also for a second show in the spring with nothing but open models and trucks on display.

**Acquires New Site at Akron
for the Building of Tractors**

Akron, Ohio, Sept. 9—Wellman-Seaver-Morgan Co. will erect a factory for the building of tractors on the A. C. & Y. railroad a short distance from Akron. The plant will employ 10,000 men and construction will begin immediately.

No statement has been made as to the cost of the plant or even the first unit, but officials say several millions will be required to complete the factory construction. Transportation system is to be developed by the Rapid Transit Co. headed by D. W. Kaufman. It is planned to use a gasoline propelled car which will make six trips a day. The transit company last year purchased several thousand acres of land but construction of the transit system was delayed by financial conditions and industries which had planned to locate on the site abandoned the plan until work on the transit system should be started.

**Refute Reports That Cars Are
Piling Up in Atlanta District**

**Only Shipments Not Ordered Are
Refused, Dealers State in Con-
nection With Rumors**

ATLANTA, Sept. 9—Reports that thousands of automobiles are piling up in the Atlanta district because of dealers' inability to handle them are without foundation. A careful investigation discloses that not more than 100 cars have been held in the cars in which they were shipped because the men to whom they were consigned could not finance them. The Chamber of Commerce found, when the report first became current, that there were only twenty-three carloads of motor cars in the city and the only reason they had not been unloaded was that facilities were not immediately available.

Inquiries among dealers show that the only cars refused by them were shipments sent on by the factories when they had not been ordered. One company turned back 100 cars which belonged in this category. Most of the dealers assert they are not having extraordinary difficulty in financing themselves. Conditions have improved in the past few weeks.

DUPONT MOTORS MOVES

Wilmington, Del., Sept. 9—The DuPont Motors Co., which last year began the manufacture of automobiles in its local plant, has begun moving to its new plant at Moore's, on the outskirts of Philadelphia. The new plant has a capacity of 150 cars a month with room for 50 more. The local works will continue to manufacture the engines for the cars.

Rig Up a Snow Plow Now for Use This Winter



Dealers in cities where snow will begin to fall in the course of the next few months can get an idea from this picture as to how the situation can be dealt with. A tractor can be brought into service for such work just as well as not and a snow plow can be constructed of boiler iron such as was done in the upper park at Yellowstone in preparation for the coming of summer visitors. From all reports this rigged-up snow plow performed wonders.

Maintaining Interest in Time Payment Sales Wins Confidence

Finance Companies Favor Dealer Where Such Policy Is Known to Be Followed

KANSAS CITY, Sept. 9—Through its policy of maintaining an active interest in time payment sales negotiated through automotive financing companies, the Waddell-O'Brien Motor Co., distributor of Master trucks, with salesrooms and warehouses at Kansas City, Wichita and Oklahoma City, has won the confidence of the financing companies.

Following the time payment sale from its origin until the truck is paid for will pay big dividends in satisfied customers, contented companies and a more liberal line of credit, according to officials of the company.

Agent Investigates Buyers

To carry out this policy the motor company employs a collector equipped with a small passenger car to make collections and investigate cases where purchasers are defaulting in their payments. In cases where a purchaser is unable to make payment due to sickness or other causes beyond his control the company makes payment for the purchaser to the financing company until he again is able to assume his time payments.

By means of this policy the company is meeting with success in time payments selling which constitutes the major class of sales here. It has lifted from the shoulders of the security company which handle the paper of the motor company a major part of its duties, the collection of monthly payments from the purchaser and as a result the company extends a more liberal line of credit at a lower rate of interest. The paper of the dealer is taken by the company in many cases with no other endorsement than that of the motor company.

Tire Dealers Endeavoring to Form a National Association

Minneapolis, Sept. 9—Recognizing the value of general organization, through their own experience gained in a smaller way, the members of the Minneapolis Tire Dealers Association are endeavoring to establish a national organization such as dealers in other automotive equipment have formed. Tire dealers associations which already have been organized in other cities will be communicated with to obtain their sentiment regarding a country wide organization. It is felt that such an association would bring about many beneficial results to the trade.

TEXAS NEEDS DEALERS

Lubbock, Texas, Sept. 10—Purchasing automobiles from dealers in New Mexico, driving them to Texas and selling them at profits ranging from \$100 to \$200 is proving profitable in this territory. It is found that the dealers in many towns of New Mexico are well stocked with auto-

mobiles, particularly those of lower price, while the demand in Texas exceeds the supply. It is an easy matter for a speculator to buy two or three cars in the neighboring state, bring them overland to points in the interior of Texas and sell them on sight at good profit. Recently a ranch foreman near Lubbock purchased three low priced cars in New Mexico, drove them to Sweetwater, Texas, and sold them upon arrival at \$100 each more than he paid for them. This transaction was so satisfactory that he returned at once to New Mexico for another supply.

Dealer Grasps Opportunity In New Traffic Regulations

Philadelphia, Sept. 9—Partly influenced by the plan of the city authorities to sweep Broad street's center clear of parked automobiles, which have been a source of annoyance for some years, James Sweeten, Jr., of the Sweeten Automobile Co., will use part of his property recently acquired for a service station as a public garage. It is somewhat of an innovation for Philadelphia to have a dealer engage in the public garage business on a fairly extensive scale.

Sheet Metal Service

Concluded from page 15

risk on an eight-cylinder touring car. The driver decided to have a joy-ride one evening, and smashed the car. Again Tucker & Bonner were assigned to the task or rebuilding.

This is interesting; all the body parts were so crumpled that they were easily stowed in the tonneau of a five-passenger touring car and when the metal workers saw the mess they wondered if, after all, they had bitten off more than they could chew; but what they did with the first car they duplicated on the second. Now they handle all the insurance wrecks. On either of these eight-cylinder cars mentioned there is not the slightest suggestion of a dent, a break or a mar of smooth surface.

From time to time some seemingly impossible tasks are performed. A car owner may be so unfortunate as to lock horns with the trolley car and comes out a bad second best. He needs service in a hurry, and gets it. Another is the victim of a truck driver and his radiator is punctured. He has only to call of Tucker & Bonner to get service, and viewed from a dollar and cents standpoint he saves money. There are numerous calls for quick service. If an owner needs a radiator quick the firm fixes him up with another until his own is ready. Three to six hour service is common with the company. The business man leaves his car at 8:30 to have the radiator repaired or the fenders fixed. He gets the car at noon.

One branch of the service is the renewing of old time models, the changing of bodies to bring them up to date. The concern in the course of a conference with a customer who desires his car brought up to the minute is always able to make acceptable suggestions.

More Foreign Made Cars Being Received in American Market

Unusual Growth Also Noted in Importation of Automotive Equipment for July

WASHINGTON, Sept. 9—Unmistakable evidences of an invasion of American markets by manufacturers of foreign automobiles is given in the statistics of July imports compiled by the Bureau of Foreign and Domestic Commerce. A phenomenal growth of approximately 10,000 per cent in the importation of automotive equipment is reported for the month. Parts of automobiles excepting tires imported into the United States during July, 1919, were valued at \$1,562 and for the same period this year the imports amounted to \$155,451.

Show Increase Over 1919

Imports of automobiles showed a remarkable increase over 1919. The twenty-six cars imported during July, 1920, were valued at \$63,304 as compared with thirteen cars and a valuation of \$7,198 for the same period last year. For the seven months ended July, 1920, 146 cars were brought into this country having a valuation of \$279,382 against forty-six cars valued at \$21,281 for the corresponding period last year.

The returns for the seven months period of this year show that the total value of automotive equipment imported was \$641,420 as compared with \$27,167 for the corresponding months of 1919.

Ottawa, Ont., Sept. 9—Figures for 1919 show the importation of 5,001 passenger cars under \$1,000 as against 14,373 in 1918; 1,149 between \$2,000 and \$3,000 as against 1,335; and 205 over \$3,000 as against 385. There were 840 motor trucks valued at \$1,000 as against 552; 569 between \$2,000 and \$3,000 as against 232; 283 over \$3,000 as against 194.

Curtiss Factory in Buffalo to Be Used for Motor Production

Buffalo, Sept. 9—The Curtiss factory here is soon to be converted from airplane production to motor and storage battery production.

The Curtiss production will be entirely removed to Garden City, L. I., according to an official announcement, and its Churchill street plant after extensive alterations will be turned over to the John N. Willys interests. Motors for Willys Knight and Overland cars will be manufactured at the plant, and a separate department will be established for production of U. S. L. storage batteries, a Willys product.

The Willys interests are said to control the majority of Curtiss stock. It is expected that about 4,000 men will be employed at the new Willys factory, which will open as soon as alterations are completed.

Exclusive Rights to Dealer in Trucks Incurs Added Burden

N. A. C. C. Backing Protest of Manufacturer Against Action of Internal Revenue Collector

NEW YORK, Sept. 9—An attempt to impose an added tax on the automobile industry was reported at a meeting of the Motor Truck committee of the National Automobile Chamber of Commerce here yesterday. So far as known only one truck manufacturer has been affected thus far and the committee members are in doubt whether it marked an isolated attempt by an internal revenue collector to increase the returns from his district or whether it was the beginning of a concerted movement. In any event it was viewed with considerable apprehension.

The manufacturer in question has been informed by the revenue collector in his district that when he gives a dealer exclusive rights in any particular territory the sales tax must be paid on the retail instead of the wholesale price. This is a reversion to an interpretation which was placed upon the law three years ago but which was abandoned upon the earnest representation of the automotive industry. If carried into general effect it will mean an added burden of about 20 per cent not only upon automobile manufacturers but all manufacturers who assign exclusive sales territory.

Under the interpretation of the law made three years ago, when a manufacturer does both a wholesale and a retail business the tax is applied on the wholesale price. Now the energetic collector declares that when a manufacturer has a dealer in Los Angeles, for example, and a branch in San Francisco, with the agreement that neither can invade the sales territory of the other, the manufacturer controls sales absolutely through his contracts and that, therefore, he must pay a tax on whatever the dealer or branch gets for the vehicle sold.

Manufacturer Makes Protest

The contention of the N. A. C. C. is that a manufacturer should be taxed on what he gets for his vehicles as a corporation. A protest has been made by the manufacturer involved to the Treasury Department in Washington and he is being backed by the Chamber.

In this particular case the revenue collector contends that Article 34 of Regulation 47 is for the protection of the wholesaling manufacturer, who is also a retailer in his right, to compute the tax on the basis given to manufacturers engaged only in wholesaling their products and that it should not give him any added privileges by reason of his retail business.

During the consideration of conditions in the trade by the truck committee, Secretary F. W. Fenn reported what he found on a trip through Oklahoma, Missouri and Kansas, to investigate the credit situation and state that the situation in that territory was distinctly en-

couraging. If there is any lack of credit it is the fault of the dealer rather than the banker.

It was announced that John J. Pulley, president of the New York Savings Association, will present the case of the motor truck as a unit of transportation at the meeting of the American Bankers Association in October.

George Fritz Resigns as Field Secretary of Equipment Body

Mackinac Island Favored by Directors for Automotive Association Spring Meeting

CHICAGO, Sept. 13.—Geo. Fritz, for four years associated with the Automotive Equipment association, has resigned as national field secretary, his resignation to take effect Dec. 15. In the field and doing executive work as assistant to W. M. Webster, commissioner, he has rendered valuable assistance to the association during these four years. Mr. Fritz has been connected with the industry for 16 years and has gone through every branch. As yet he has no definite plans for the future.

The mid-convention meeting of the association was held in this city Friday and Saturday of last week when the various committees took up mainly routine matters. All committee meetings were well attended and much business was transacted.

Spring Meet at Mackinac Island

The board of directors voted in favor of Mackinac Island for the spring meeting in June, 1920. This recommendation will be submitted to the membership at the convention which will be held at the Coliseum Nov. 15 to 20. The annual show will be held in conjunction with the convention. The show committee to-day is assigning spaces and making further arrangements for the exhibit.

The standardization committee in charge of the chairman, Fred R. Hall, of the Northwestern Chemical Co., Marietta, Ohio, meeting with the subdivision chairmen, completed its schedule of matters to be brought up at the November convention.

First Nash Four Turned Out at Company's Milwaukee Plant

MILWAUKEE, Wis., Sept. 13—An elaborate ceremony marked the completion of the first car of the regular production of the Nash Four by the new Milwaukee works of the Nash Motors Co., Kenosha, Wis. The Nash company broke ground Nov. 1, 1919, for the new plant of the "Four-Cylinder Car Division" as it is officially known. Already \$2,000,000 has been expended for buildings and equipment. As projected, the plant will employ 2000 men and produce 10,000 four-cylinder Nash cars. B. W. Twyman is general manager of this division.

Spirit of Co-operation Is Seen Among All Elements of Industry

Retail Sales of Passenger Cars Show Slow but Steady Increase, Say Dealers

NEW YORK, Sept. 14—Confidence is increasing that the country will come safely through the readjustment period. Business men who were prepared for an emergency or who took advantage quickly of the ominous signs in the early spring will be doing business as usual when something like normal conditions are restored, which may be this Fall but is more likely to be next Spring. They will be doing well, however, if they pay expenses until the tide turns.

There still is business for manufacturers but they will have to pursue it to its lair and not wait for it to come out into the open. An era of competition has returned. Producers who want to make sales must study the business chart as carefully as a mariner looks for a breeze. Conditions throughout the United States are "spotty." In some sections sales opportunities are legion and they are the ones in which operations should be pushed.

Must Study Prospect's Needs

Dealers and merchants also have opportunities open to them although they are circumscribed more or less in their operations. They must get off the beaten track and must study their fields. They must seek out the persons who have money to buy. Then they must study the needs of these potential purchasers and sell according to these needs.

One of the gratifying signs of the times is the spirit of co-operation which is apparent throughout the automotive industry. Each element seems eager to help every other element. The parts and accessory makers are willing to extend credit extension ordinary business prudence will permit. They do not want receiverships and are willing to go to any legitimate lengths to avoid them. They much prefer to have plants operated by creditors' committees.

Wait for Lower Cost of Living

There can be no return to normal until the cost of living goes down and economists agree there can be no marked decline in the commodities in every day use until abnormal wages are adjusted. There is indisputable evidence that the great mass of the people of the country are determined to buy only absolute essentials until they can see a price level which they consider fair. This determination is less evident in the automotive industry than in many others, however, for dealers in almost every section of the country report a slow but steady increase in retail sales of passenger cars. If a wise and energetic sales policy were pursued it is likely the same would be true of trucks.

Bank Has Tent in Motor Row at Maryland's Annual State Fair

Twenty-five Dealers Represented at Show Report Unprecedented Business Done

BALTIMORE, Sept. 9—The Towson National Bank had a tent in the midst of motor row at the Maryland state fair which was held at Timonium, Md., beginning August 31st with rest rooms for its old customers and for the making of new ones, an incident that gave dealers an added incentive to talk of the stability of the automotive industry.

More than twenty-five dealers were represented at the show and all the equipment was sheltered under tents. Yet this did not prevent several of the more progressive dealers from presenting an artistic exhibition in the showing of their lines. The firms demonstrating farm lighting equipments built concrete foundations and had their outfits in operation, thus also illuminating their display quarters.

Prospects Anxious to See Displays

The displays included fifty-four trucks of all sizes and types, five tractors, one trailer, several tire and accessory exhibits and a welding show in operation which gave the farmers a new insight into repair methods.

Much business was done. Many of the firms reported that they had done more actual business by Thursday afternoon than they had ever done at any previous fair. In previous years it has been necessary for the sales force to stand outside the tents and invite the visitors into the quarters to examine the display. This year, however, the farmers and merchants of the rural communities came right along into the tents with their lists of questions ready.

Big Demand for Closed Cars

The passenger car purchases and the prospects obtained showed the farmer buying closed cars, sedans in particular, and most of the their inquiries were directed toward the closed models. The majority of business done was cash or the majority cash with very short terms. Baltimore county, in which Timonium is located, is one of the rich counties of the state and several wealthy counties border it.

With the Maryland state fair as large as it proved to be this year and with bright prospects for larger improvement next year the Baltimore dealers are afforded an opportunity to have two motor shows instead of one each year.

TO MAKE TRACTOR ON LARGE SCALE

Columbus, Ohio, Sept. 9—The Marvel Tractor Co. of Columbus, which has increased its capital from \$35,000 to \$500,000, has completed one model which was exhibited at the Ohio state fair. It is now planned to erect a factory, though the site has not yet been selected, for the manufacture of the tractors on a large scale.

The tractor is designed for general farm work and has a 25 hp. engine placed under the frame close to the rear wheels. This is designed to give an absolutely square turn and to give additional power. It has a 31 in. clearance for cultivation. The Nutt-All transmission is used and the final transmission is by rolling chain. While the price has not been settled upon it will be in the neighborhood of \$1,500.

Dealers Use State Fair to Show Logical Distributing Center

Wilmington, Del., Sept. 9—All motor trade matters in Wilmington this week is centering in the Delaware state fair which opened Labor Day and will continue for five days. Under the auspices of the Wilmington Automobile Trade Association the largest display of cars in the city's history is at the fair and, in addition, daily truck and tractor demonstrations, have been planned. This has been made possible by the addition of 42 acres to the fair site. Practically every agency in the city is represented.

The outstanding feature of the exhibition, in addition to making a drive for local trade such as was never attempted before, is to emphasize the fact that Wilmington is the logical distributing point for the state and, as the fair represents the whole state, being partly financed by the state legislature, the opportunity is regarded as ideal.

SALES BUILDING FOR CADILLAC

Minneapolis, Sept. 10—The Northwest Cadillac Co. has begun construction of one of the largest sales and garage buildings in the city, covering nearly half a city block and costing \$225,000. The Cadillac Investment Co. is financing the building.

Celebrates Anniversary With Its First Annual Convention

Carolinas' Automotive Trade Association Makes Plan for a Double Celebration This Month

CAROLINAS, N. C., Sept. 9—Preliminary reports from many cities of North and South Carolina indicate that Greensboro, N. C., will note a considerably augmented population upon the occasion of the first annual convention of the Carolinas' Automotive Trade association, to be held in that city September 24-25. This organization, which is celebrating its first birthday with the Greensboro gathering, draws its membership from the automotive fraternity of both states. Lee A. Folger is president and Paul F. Brophy, executive secretary.

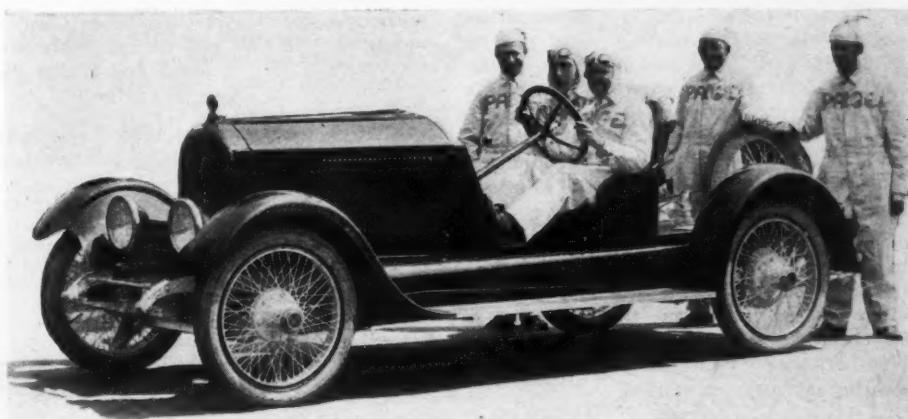
The first day of the convention will be given over the craft meeting when the individual problems of the members from the various units which go to make up the industry will be discussed. The second day will be devoted in great part to addresses, the election of officers for the ensuing year and other routine convention business.

Nearly 300 Members

A trade frolic with vaudeville features secured from Washington for the occasion will be a social feature of the convention. Another entertainment feature will consist of a barbecue at the Greensboro Automotive Trade Association.

During the twelve months of its existence the Carolinas' Automotive Trade association, which is affiliated with the National Automobile Dealers Association, has expanded from a membership of 60 to a point which is now not far removed from the 300 mark. Plans will be presented at the convention looking to an even greater expansion during the coming year.

Mulford Joins Paige-Detroit Organization



Ralph Mulford, since Barney Oldfield's retirement from the racing field, the oldest driver in point of experience in the automobile field, has joined the organization of the Paige-Detroit Motor Car Co., and will devote his time to exploiting the Paige and preparing to demonstrate its speed, power and endurance in several contests and exhibitions already arranged

E & W Truck Unit



One Attachment Made Especially for Converting Dodge Cars Into Trucks—Ninety Per Cent of Load Carried On Rear Axle

SOME years ago a great many companies rushed into the truck attachment business without due consideration of its possibilities, for there seemed to be a great public interest in these attachments. This was especially true of the Ford attachments. Originally these were chain drive attachments and later some manufacturers made shaft driven outfits. This market suddenly dwindled however, as in some cases the units gave trouble and needed much service.

However, the attachment unit is not to be condemned because of the difficulties the manufacturers of the units have met with. The E-W Co., Milwaukee, builders of the E-W attachment unit, has studied the truck attachment business very carefully and the units which they have been making for a number of years proves the soundness of the design and the wide

adaptability of the universal unit. The other unit is for the Dodge chassis exclusively.

The Universal unit is furnished with a 14 ft. straight, one-piece frame with a short propeller shaft and two universal joints suspended from the center of the frame by a Hyatt roller bearing adjustable hanger. This makes it possible to secure any wheelbase up to 180 in. from any make of car, by cutting off or regulating the E-W frame accordingly.

Special Design for Dodge

For cars with rear end transmissions a special transmission hanger is furnished. So it can be truthfully said that the E-W can convert any type of passenger car into a 1½, 2 or 3-ton truck. The other unit, which is designed especially for the Dodge chassis, is made

in large quantities and is made in two styles. The full frame unit accommodates the Dodge engine and the front springs and axle of the Dodge car. A special cross-member for the front of the Dodge engine is supplied which fits the engine support. The conventional Dodge spring hangers can be fitted to the frame. Provision is also made to secure the Dodge radiators, and holes are drilled in the frame to accommodate the Dodge steering gear.

A choice of bodies with different types of axles, internal gear and standard worm drive units in any size, 1½, 2 and 3-ton, is given. Solid and pneumatic tires are optional. Ninety per cent of the load carried by this unit is carried on the rear axle and the Dodge chassis is therefore stressed to practically the same degree as it was in the passenger car.

Parker Truck Production Centered on Three Models

THE Parker Motor Truck Co. of Milwaukee, Wis., after a careful study of truck requirements, is concentrating exclusively on the production of models in 3, 3½ and 5 ton sizes. Many of the parts of all models are interchangeable which lessens the parts investment of the distributor and reduces the manufacturing cost of the parts. Production is also greatly facilitated by the elimination of different sizes of parts.

These models use the Parker full floating worm gear axle of three-piece electric cast steel construction and Timken taper roller bearings throughout. A Bosch high tension magneto and the Westinghouse two-unit starting and lighting systems are used.

The power plant is a Super-Military type Wisconsin. Oil is pumped by means of a gear pump and is forced under 20 lbs. pressure to all main bearings then to the crankshaft, to connecting rod bearings, and to piston pin bearings. The latest type of Monarch governor is used,

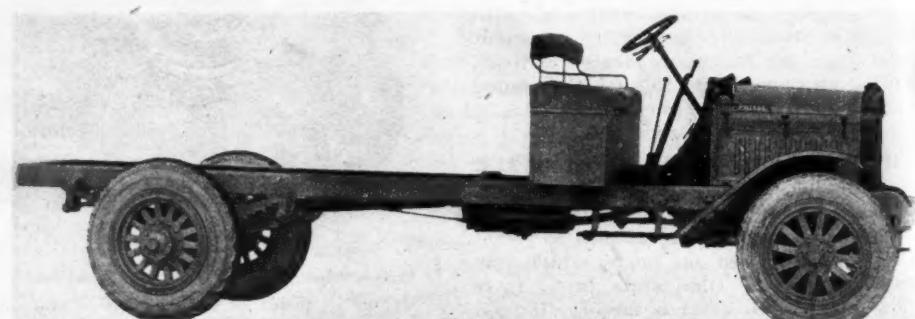
being bolted between carburetor and inlet manifold. The Parker cast radiator with staggered vertical tube core is mounted with ball and socket joints protecting it from vibration and frame distortion.

Power is transmitted from the engine through a multiple disk Brown-Lipe

clutch with all working parts enclosed. The Warner transmission is of the four-speed selective type, equipped for power take-off and power driven tire pump. Power is carried to the rear axle through tubular propeller shaft with Thermoid joints between clutch and transmission and Blood joint between transmission and rear axle. The steering gear is the Ross semi-reversible worm and nut type.

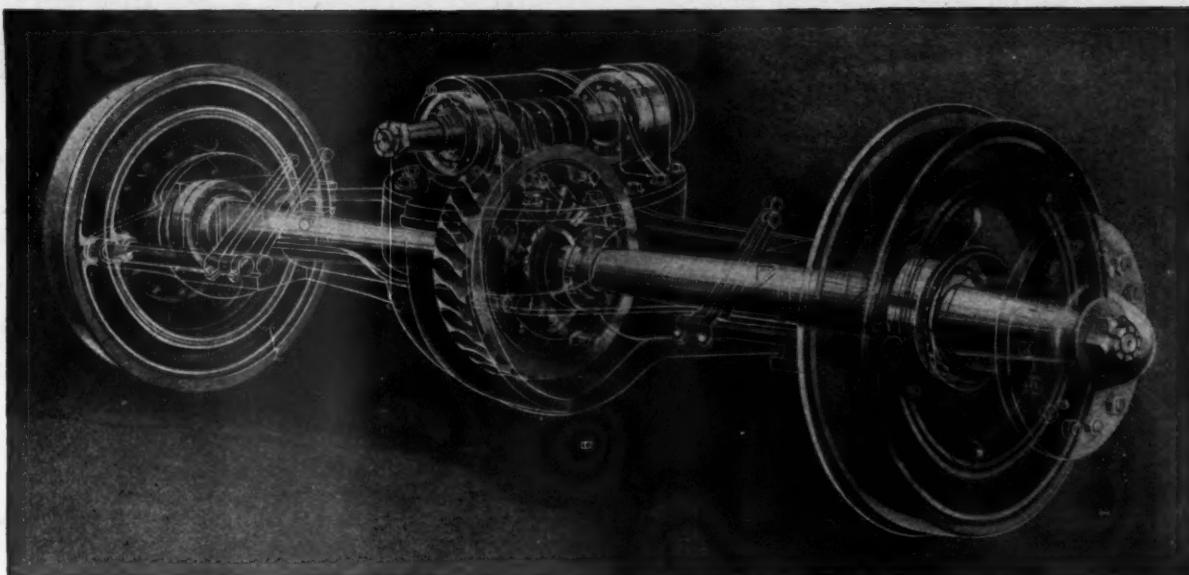
Chassis points requiring lubrication are cared for by the Alemite System. The specifications below of the 3½-ton model are in a general way a description of all

(Concluded on page 39.)



Side view of one of the Parker models. The Wisconsin super-military engine is used. Chassis lubrication is by the Alemite system

Attaches to Any Car



Phantom view of the Wisconsin axle

Wisconsin Axles Standardized Throughout

Made in Sizes for Trucks of From One to Five-ton Capacity. Worm Drive Employed in All Models

THE Wisconsin axle, made by the Wisconsin Parts Co., Oshkosh, Wis., is a particularly well-built axle and is represented by a full set of sizes adaptable to 1-ton, 1½-ton, 2-ton, 2½-ton, 3½-ton and 5-ton trucks. The Wisconsin line of axles is highly standardized, the same type of construction being employed from the smallest size to the largest. Worm drive is employed on these axles and the worm is mounted in a sturdy fashion. The front worm bearing is a single ball bearing race of large dimensions which merely supports the worm shaft. The rear worm bearing is a double row of heavy duty thrust type. The worm shaft housing is so mounted so that by removing eight or ten bolts, depending upon whether the axle is the small or the largest type. The worm shaft housing and differential gears will come out as a unit, which construction is similar to that employed on many other makes of worm driven axles.

Housing Cast in One Piece

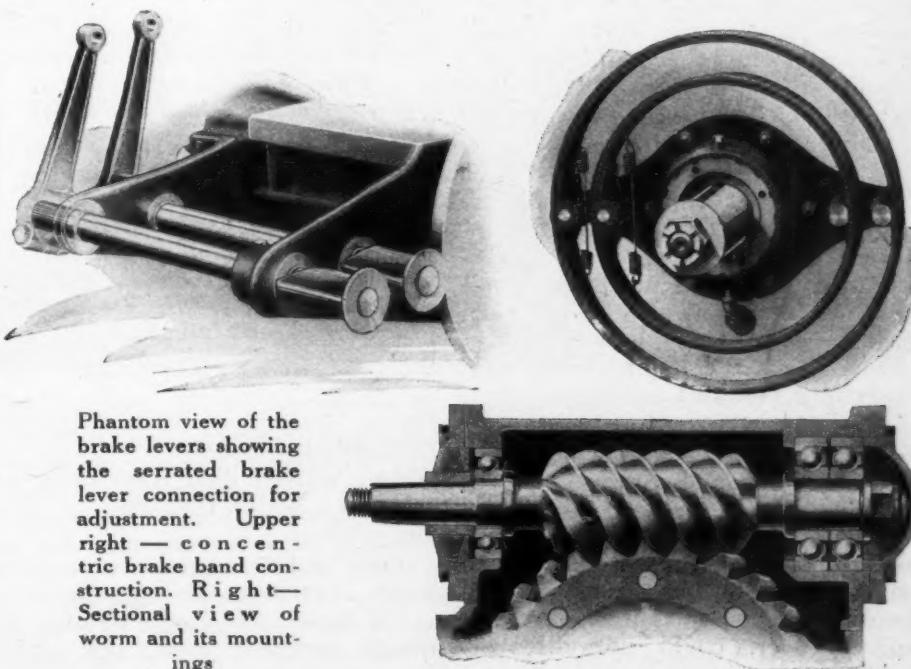
The housing of the Wisconsin axle is very interesting from a construction standpoint. It is made of malleabilized cast iron. The whole housing is a single piece casting, extending from wheel to wheel, no joints are employed either welded or riveted, but the whole is uniform metal throughout. Added strength is given the housing by casting heavy ribs longitudinal with the axle. These ribs are on the outside and can be seen in the illustration. The inside of the housing is smooth and is free of pockets which might be a possible source for sand and other grit to lodge in, which would cause trouble and difficulty later on. Even the spring seats are integral with the housing and provide ample bear-

ing for the spring. It is interesting to note that the oil filler in this axle housing is commodiously large. The oil can be poured into this filler from an ordinary measure without the aid of a funnel. A very rigid inspection system is part of the manufacturing process of this housing.

During the test of the axle the housings are submitted to a pressure test, in which the casting is mounted at the spring pads and a pressure of twenty-five tons applied at the center. This pressure is probably many times greater than that which will be met with in service, and by the assurance that the axle

holds up under this severe test it seems reasonable to state that it will hold up during actual service. The company claims that an axle housing has never broken during service.

The shafts are of chrome nickel-steel; are very large, tapered and fitted with the latest spliced sections for attachment to the differential. The differentials of these axles are of Brown-Lipe-Chapin construction. A special feature which insures even wearing quality of the worm is that a shoulder is provided on the differential flange which gives total circumferential bearing of the worm on the differential housing.



Phantom view of the
brake levers showing
the serrated brake
lever connection for
adjustment. Upper
right — concen-
tric brake band con-
struction. Right—
Sectional view of
worm and its mount-
ings



A Department of BETTER BUSINESS

Conducted by Ray W. Sherman

The Secret of Salesmanship

SEVERAL years ago was begun what was thought would be a great, world-wide movement for better business. An organization of world-wide name was founded, local clubs were started, schedules of meetings were laid out and the thing seemed to start off fairly well.

And then came the war and the "petering out" which had been in evidence was suddenly accentuated and the great big movement died.

Probably one of the main reasons why the movement didn't go through to the big success, its founders expected was that the business world flocked to the meetings of the parent organization and its clubs with the expectation that it would discover the great secret of success in salesmanship. But it didn't find what it sought.

Some Are Looking for the Magic Means to Success

Those who hungrily crowded the meeting halls were like Ponce de Leon who sought a fountain of perpetual youth in Florida years and years ago. They were like him because they expected to find some magic means to the end desired.

Today we know that perpetual youth lies in the human heart in one's emotions, beliefs and ideals, and that he who would be young all his life can practically be so if he will do those hard and trying things which keeps the human mind and body in a youthful condition.

The man who got up before one of these salesmanship clubs and made a grand and eloquent speech won a lot of applause, the club members enjoyed the evening, but the after-effects was not such as to maintain interest in the movement, because the club members, on thinking it over, could not discover

wherein the grand speeches had helped them discover the secret of salesmanship.

Some few men gave practical talks and were well received. Some of them said that the secret of salesmanship is ninety per cent plain, hard work. Many of the searchers for the secret of salesmanship regarded this as "old stuff" and became discouraged in their search for

unvarnished, grueling, persistent, brain-fagging, foot-tiring, every-day work.

It is not a pleasant message to convey—but it is true. It applies to the business of the dealer, the salesman, the garageman and all others whose living comes from a contact with the public.

Take, for example, the dealer who "goes into" trucks. Many dealers have taken truck agencies and then dropped them in the belief that they were not fitted to sell trucks. The truth in most cases was that the dealer or salesman did not understand the secret of salesmanship—he didn't WORK hard enough.

The secret of truck salesmanship is to get a prospect list, using lists of business houses from the classified telephone directory, securing names from personal knowledge of the business of the city, watching trucks and horse-drawn wagons in service, and using every possible means for gathering a list of men who could use trucks.

Hard Work Intelligently Done Will Sell Anything

That, in itself, is hard work, different work. But still harder work is to come. To this prospect list must be sent literature, letters, and all sorts of INTELLIGENT sales appeals, and there must be miles and miles of weary foot-work by salesmen, with call after call, and effort after effort. The man who will try to sell any saleable product by that plan cannot fail if he is otherwise on a sound basis.

Insurance men, book agents and other specialty workers believe in the law of averages. They believe that a certain number of INTELLI-

the secret—and so the great movement practically died.

And with it died the chance of sales success for thousands of men and women.

They had the secret within their hands—but they didn't recognize it.

For the secret of salesmanship IS ninety per cent work—just plain,

GENT calls must net a certain number of sales. That's why these men keep calling, calling, calling on you. Their business is making calls. And the calls bring them business.

Even today, when sales are slack, the sales volume of many dealers could be materially increased if they would work harder. This is not a reflection on dealers generally, but just a suggestion that, even with conditions of today, more sales than are being made could BE made if

Did You Ever—

Did you ever stop to think that the young man or woman in your organization, whom you may not have noticed yet, is capable of taking hold of some troublesome problem in your business and untangling it?

Why not make a list of the things that are going wrong, that are your greatest problems? And make a list of the people you may not have considered as solvers of these problems? Then put the two together and see what you get.

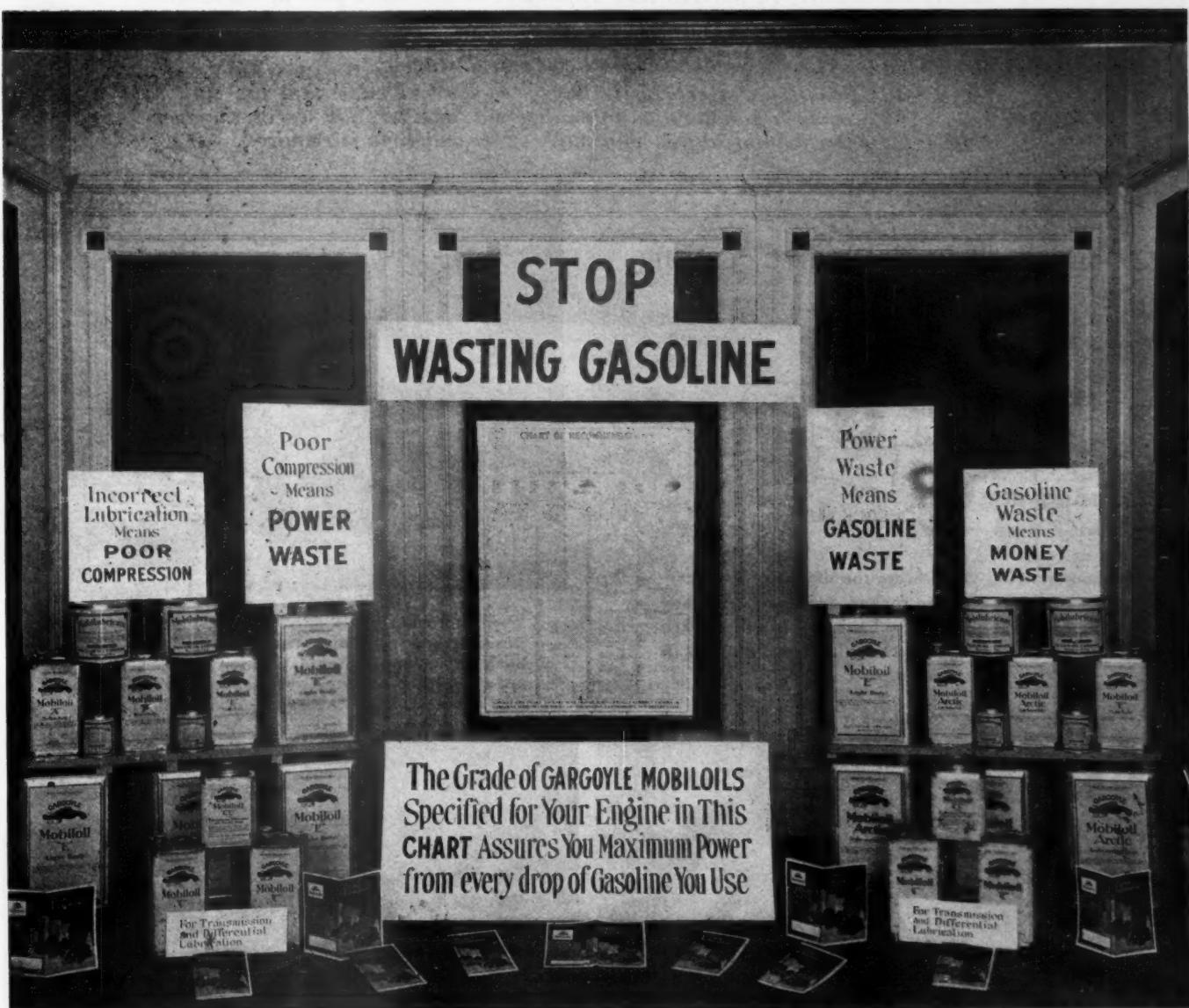
It may make money for you.

a greater intensiveness were injected into the sales effort of the industry.

Sometimes a bright, quick young man is passed in the field of sales by another man who is obviously not the mental equal of the bright youth.

When you analyze the successes and failures of salesmanship, of business of life, you will find that the secret of all real success has been named hard work.

What You Can Do With a Few Cans of Oil



In its various issues Motor Age has endeavored to point out that window trimming is not a difficult job, and that a well trimmed, well lighted window is one of the best little business getters there is. A window does two things: 1—It draws public attention to your place of business, and 2—It stimulates the sale of the articles displayed. Every dealer and garageman sells oil, and every car owner will find it a great convenience to have a can in his own garage. In this simple display the articles used are cans of oil and booklets. If the oil you handle has nothing to take the place of the large chart in the center, make a sign or draw a cartoon. The other signs you can make yourself or have made at small cost. Change the words to fit YOUR oil. The pedestals for the higher rows of cans can be made from common boards. If your window has no suitable background make one with fiber board, cheese-cloth or any other suitable material.

And then send us a picture of the window.

Standard Mechanical Operations in Tractor Service



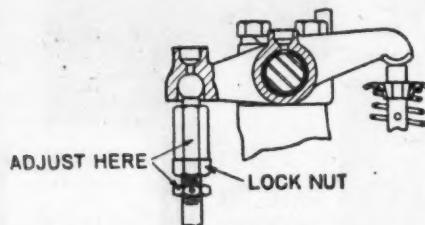
by John Charles Thorpe, M.E.
and Gustav Howard Radebaugh

THE article herewith, while part of the series on Standard Mechanical Operations in Tractor Service, is, nevertheless, applicable to the entire field of automotive service work. Valve mechanism basically is not very much different in a tractor than motor car or truck engine, consequently what is said here applies in a large measure to any vertical cylinder internal combustion engine.

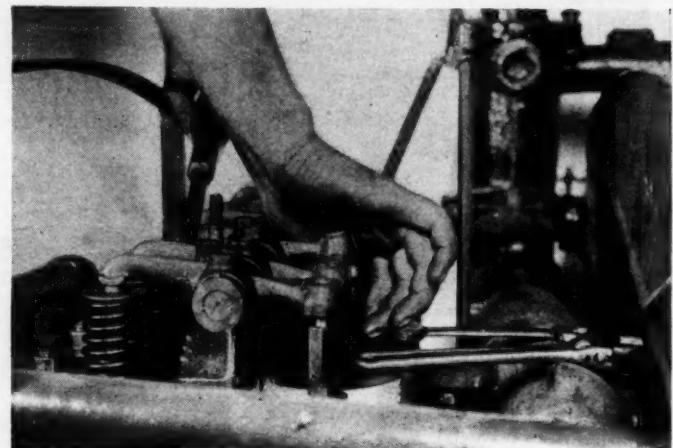
In studying this series of articles it is well to bear in mind that the authors have given much study to the question of motion and time. In other words, the operations have been worked out so that minimum effort and time is required.

Replacing Faulty Valve Spring

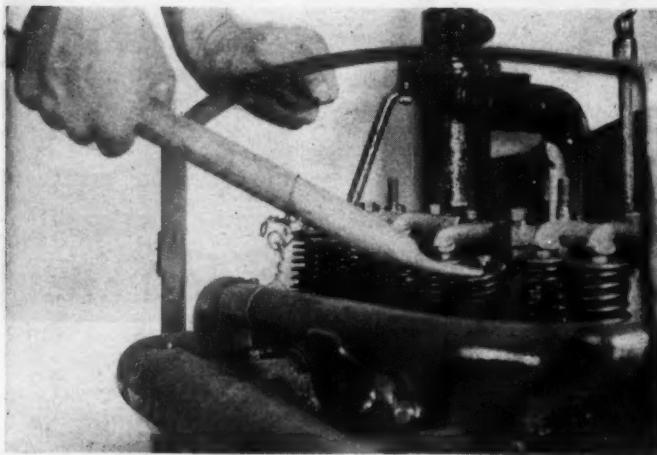
(Concluded from last week)



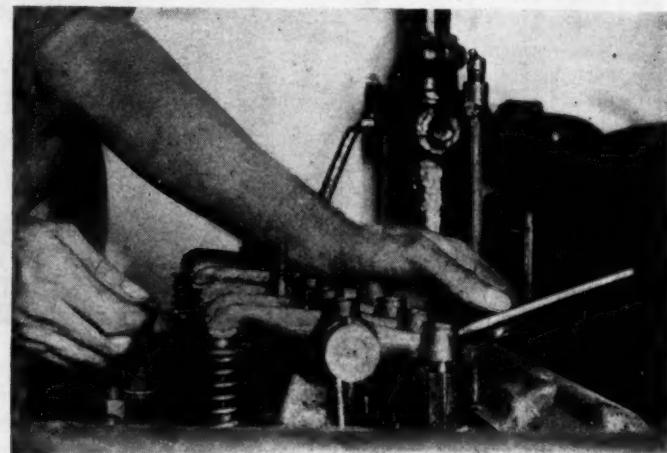
The accompanying view shows the details of construction of the rocker shaft, rocker arm, lock nut and adjusting nut of the valve mechanism. It will be seen that the operation of adjusting the valve tappets is quite a simple one



8—The rocker shaft may now be replaced in proper position and the valve tappet adjusting nut screwed back to its approximate position of operation. It is apparent that a more or less delicate adjustment is necessary before the valve action will be efficient



7—Using the forked tool as previously described, the spring may now be compressed as before and the split washer put in place in the retainer. Considerable care should be exercised in this procedure to see that the washer fits snugly. If this is not done it will be necessary to repeat the operation



9—The clearance between the valve stem and the actuating end of the rocker shaft should be one one-hundredth of an inch. This may be determined by using the ordinary thickness gage or magneto point gage. It will be clear that if the adjustment is too close, the valve will be held open and the cylinder will cease to develop power

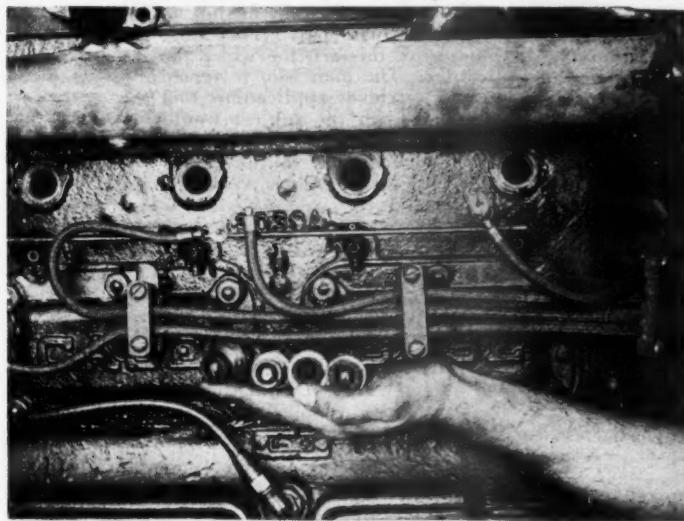
Locating Leaky Valves—Regrinding and Reseating

LEAKY Valves Requiring Regrinding and Reseating. It is well understood that proper compression is a vital factor in the efficient and economical operation of the engine. Therefore any condition that develops a leak in the compression space of combustion chamber should be promptly remedied.

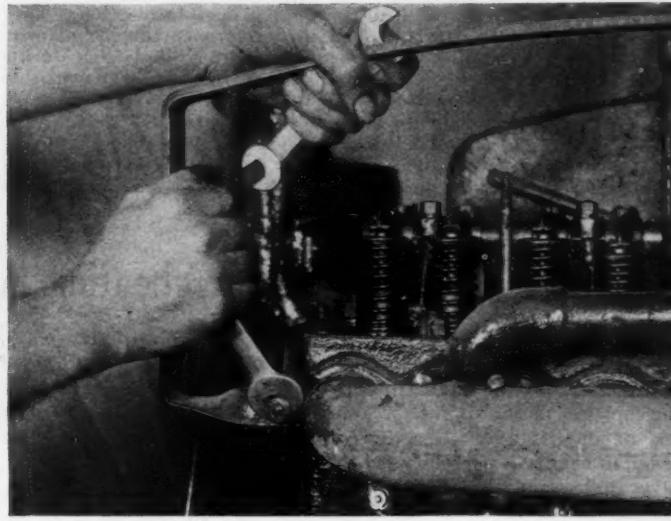
There are several causes for loss of compression, namely: loose or worn pistons and rings, broken or poorly fitted gaskets and pitted or poorly seated valves.

It is assumed that when the tractor leaves the factory, the engine is in proper working order with the valves well seated and the compression good. After the engine has run

for some time, a residue of burned fuel and oil collects on the interior of the firing chamber and upon the valves and piston heads. This process is ordinarily called carbonization and is a common cause of low compression pressure. It will be readily understood that the deposit of carbon on the valves and valve seats has the effect of destroying the joint between the valve and its seat, thus allowing the gas to leak by on the compression stroke and lowering the mean effective pressure on the power stroke of the engine. It is also clear that such a leak through the exhaust valve would have a tendency to reduce the effective volume of the fuel charge on the intake stroke.



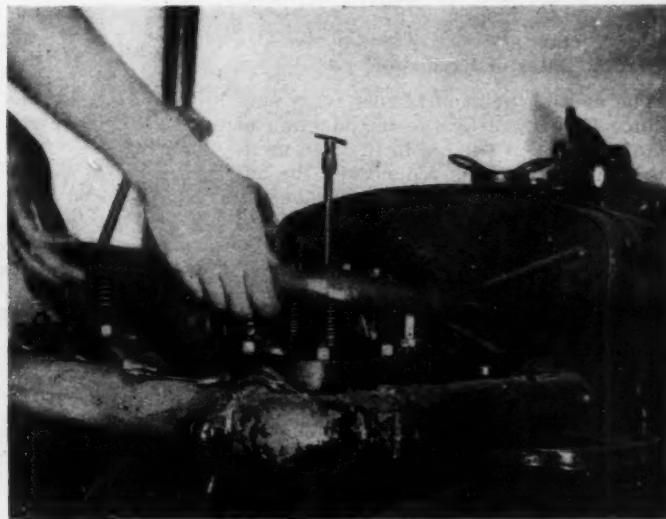
1—To locate leaky valve, remove all spark plugs except number one, as previously described. Turn engine over until compression pressure indicates compression stroke on cylinder number one. Now remove spark plug number one; put number three in place and test compression. Repeat operation for numbers two and four. Notice carefully the "feel" of the engine as it passes the compression point. It will be easy to determine "light" and "heavy" compression.



2—To remove firing head: Drain water from circulating system as previously described. Remove valve cover as previously described. Loosen valve tappet adjustments and disengage rocker arms as previously described. Caution.—It will not be necessary to remove intake and exhaust manifold from firing head. Remove yoke that is used to support the hood covering the engine

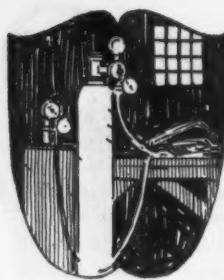


3—Disconnect the water manifold from the firing head by removing the cap screws from the two flanges making the connection on the exhaust side of the engine



4—It will not be necessary to remove the water pipe or manifold from the engine as the hose connection will permit it to be moved and placed below the exhaust manifold as shown in subsequent views

Operations on regrinding and reseating valves to be continued next week



Autogenous Welding

What it is and how it is applied



THIS is the ninth of a series of articles on autogenous welding and deals with the expansion of metals. These articles are intended to be of aid to the man who must learn the art of welding with little or no personal instruction. They also are intended as a reference for the man attending a welding school. It is likely that during the first few months of his instruction many problems will come up that may be solved more readily with these articles on hand.

Finally, this series should be of benefit to any automotive service man or repairman, even though he never intends to have a welding torch

in the shop. The reading of these articles will give him an understanding of the subject which should greatly aid him in general repair work. He will be better able to decide, when he has a part to repair, whether it is feasible or not to weld it, and if so, if it will pay. The more familiar one becomes with this art, the wider the scope of its application. The man who is versed in the art will find many clever applications that one who is less familiar with the subject would never dream of. An understanding of welding principles offers a new technique to the repair man.

Part IX—Preheating and Expansion of Metals

SINCE autogenous welding is the joining together of two metal parts by uniform fusion at their line of contact the melting points of the different metals are of importance. In other words, in order to secure a perfect weld it is necessary that each part be melted and the molten metal allowed to flow together and then harden.

A study of the table herewith will be profitable. Of the metals listed, wrought iron has the highest melting point, from 2732 to 2912 deg. Fahr. Next to it stands nickel with a melting point of 2645. Steel has melting points varying roughly from 2300 to 2700 and cast iron from 1900 to 2800. Of the irons and steels, wrought iron has the highest melting point because it is purest containing practically no carbon or other elements.

Different Rates of Expansion

The melting point of almost every substance is lowered by the introduction of another element soluble in it. The melting point of water is reduced by the addition of a certain amount of carbon the iron is classed as steel and if enough carbon is added it becomes cast iron.

Most materials expand with increase of temperature and this is particularly true of the metals. The rate of expansion is different for each metal, that is, no two metals expand the same amount for the same rise in temperature; the rate, however, is constant for any particular metal or alloy.

The amount any metal expands as a result of the temperature rising one degree is very small. Take cast aluminum for example: Its coefficient of linear expansion is .00123 as shown by the accompanying table which means that a rod 1 in. long will expand .00123 in. when the temperature is raised 1 deg.

Suppose, however, that the rod is 100 in. long, then the total expansion per degree will be .00123 in. Finally, suppose that the temperature is raised 1000 deg. instead of 1 deg. Then the total expansion will be 1.23 in.

It should be plain, therefore, that under the high temperatures which the

blowpipe generates that the effect of expansion under heat must be considered. The worst of it is that the blowpipe applies an intense but local heat with the result that a small portion of the whole piece may be greatly expanded with consequent enormous stresses on the whole piece, the result being a warped or frac-

Table Showing Expansion Properties of Metals

Metals	Form	Weight, Lbs./cu. in.	Tensile Strength	Coefficient of Linear Expansion, per Degree F	Specific Heat	Melting Point, F	Conduc- tivity Compared to Copper
Aluminum	Cast	.0924	12000-14000	.0000123	.2185	1215	.504
	Drawn	.0967	25000-55000	.0000136	.2185	1215	.504
Brass ¹	Cast	.3036	18000-20000	.00000957	.0939	1740	.204
	Drawn	.3036	40000-78000	.00000957	.0939	1740	.204
Bronze ²		.3132	36000	.00000986		1650-1750	.735
Copper	Cast	.3186	24000	.0000093	.09515	1982	1
	Drawn	.3186	30000-60000	.0000093	.09515	1982	1
Iron	White Cast	.2840	13000-22000	.00000556	.1138	1922-2075	.152
	Grey Cast	.2840	18000-29000	.00000556	.1138	2228-2786	.152
Iron	Wrought	.2779	50000-90000	.00000648	.1138	2732-2912	.156
Steel	Mild	.2834	55000	.0000063	.1165	2687	.139
	Hard	.2834	78000	.0000063	.1175	2370	
Lead		.4108	1720-2050	.0000162	.0314	621	.076-.083
Nickel		.3179	54000	.0000071	.1086	2645	.14
Zinc	Cast	.2479	5000-7000	.0000161	.0955	786	.303
	Rolled	.2598	5000-7000	.0000161	.0955	786	.303

¹—Copper 60% Zinc 40% ²—Copper 90% Tin 10%



Fig. 24—These photographs illustrate the charcoal pre-heating furnace. The furnace is constructed loosely of fire brick on a fire brick floor in this case. The casting is put in place and the space surrounding it is filled with charcoal. A little kerosene is sprinkled over the charcoal and the fire is lighted. This is the stage shown in A. The furnace is then covered with asbestos paper in which two or three holes

have been poked to give ventilation, and the casting allowed to remain until it is at a cherry-red heat. Then a hole is broken in the asbestos covering just large enough to allow the operator to reach. Asbestos paper keeps the heat in. This has a two-fold advantage. It reduces the discomfort of the operator and prevents the possibility of chilling the casting which might result in breakage.

tured part unless proper precautions are taken against expansion.

As seen from the table given here of the metals most commonly welded aluminum expands the most, bronze and brass next, then copper, steel and iron. Naturally, the amount that the piece expands is of importance in determining what treatment to give the piece so that the expansion will not injure it.

In malleable or ductile metals the expansion is liable to produce warping or deformation of the piece while in materials that are brittle—such as cast iron—the result of expansion or contraction is breakage.

Preheating Saves Acetylene

Sometimes the weld is in such a place that expansion does no harm. For example: if the weld were on the edge of a large flat piece it might be that the localized heating would set up no serious strains. Perhaps the best example is the welding of two rods together. The heat of the torch would cause a certain amount of expansion in both of them but since both are free to expand no harm is done.

Where expansion is restricted it is usual to preheat the piece thus producing an equal expansion all over. After the welding is performed the piece is allowed to cool gradually and thus it slowly assumes its normal size.

Preheating often saves acetylene and oxygen too. To attempt to weld some pieces without preheating would mean that an unusually large amount of heat to bring the adjacent parts to the required temperature would need to be

supplied by the torch. In such a case the cheaper fuel used in preheating would effect an economy.

Preheating often saves time. The fact that the piece is hot means that less heat must be supplied by the torch so that welding work may proceed with greater rapidity since it is necessary for the torch to supply less heat to the metal than would be required otherwise.

The method to use in preheating depends entirely on the size and character of the piece and the means at hand available for preheating.

The simplest means for light objects is the secondary or envelope flame of the blowpipe. In preheating thin castings and thin sheet-metal work it is only necessary to play the envelope flame along the line of the weld for a few seconds in order to bring the pieces to a red heat.

If the piece is larger it may be necessary to employ a gas or oil burning preheating torch. The area that the torch flame will cover is necessarily limited and consequently can only be employed with complete success on work where localized preheating is sufficient.

Building Brick Furnace

A charcoal fire is a common method of preheating adapted to castings of almost any size, large or small. The usual procedure is to build a small temporary fire brick furnace around the piece and then fill it loosely with charcoal. Coke and charcoal are occasionally mixed.

Since the combustion of the fuel is slow the casting is heated very gradually and this is just what is desired in order that

it may be heated evenly. An air blast should not be used. Welding should be carried out while the casting is at a dull red temperature.

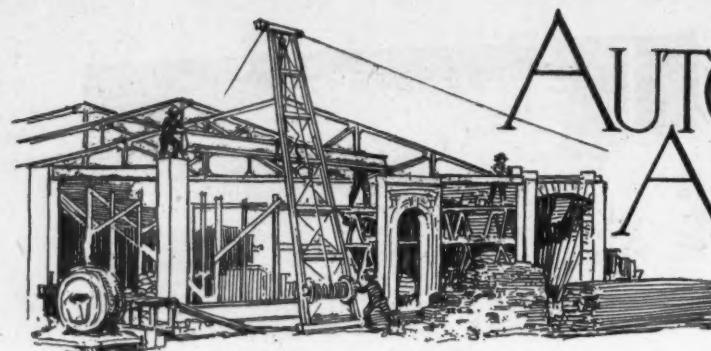
If there is danger of the casting cooling if it is removed from the fire it should be allowed to remain half buried in the coals while the welding is done. To reduce the amount of heat radiated from the fire and consequent discomfort to the operator the fire may be covered with sheets of asbestos except for the part to be welded.

Where it is necessary to preheat many castings it is best to purchase a preheating oven or furnace. The fuel used may be coal, coke, charcoal, gas or oil depending on what is desired. In some cases the furnaces are muffled, that is, the flame is not allowed to play directly on the casting while in others the casting is placed directly in the flame.

Rapid Cooling Undesirable

Rapid cooling of the weld is usually undesirable. In general, rapid cooling hardens the metal and if the piece is not simple in structure stresses which will cause warpage or breakage may be set up.

Various methods may be employed for cooling them slowly or annealing. If the piece is small it may be dropped into a box filled with a mixture of hydrated lime and fiber asbestos. Larger objects which have been preheated in a charcoal or coke furnace may be readily annealed by allowing the piece to remain in the fire, covering it with cinders or asbestos to keep out the air. The fire is allowed to die out and thus the piece cools slowly with the fire.



AUTOMOTIVE ARCHITECTURE

Planning and Building Problems



CONDUCTED BY TOM WILDER

Storage Building With System of Skylights

No. 267

We have a lot 50 ft. by 200 ft., frontage of 50 ft. and running along a narrow 10 ft. alley for 200 ft. We wish to build a one-story building covering this lot, the first 50 ft. to be used as office, showroom and rest room for women. The back 150 ft. will all be used for storage, and no part of it for machine shop.

We have an idea that, situated as it is, we had better have solid brick walls, lighting by skylights. However, we are entirely open to suggestions as to design and material.—Wilson Garage Co., Bardstown, Ky.

You are quite right about the lighting; if there are buildings along the other side of the alley, side windows will be of little benefit. If the space is open with no chance of being built upon, high windows with the sills 8 ft. from the floor and extending practically unbroken the whole length would give pretty good results, but the light would not be as good, nor the distribution as even as with the skylight system we show. It would be well, however, to take advantage of the open space and build windows into the women's room and stockroom which are small and could be adequately lighted from these windows.

Considering the long narrow entrance way, it would be better to make this a one-way door, as then there would be no chance of congestion and all cars could leave by the alley. The alley should be a one-way alley since it is too narrow for teams or cars to pass.

The roof had better be trussed and post free, the freedom of car movements

being well worth the extra expense in a storage garage.

Another suggestion is to store all the short cars on one side which will increase the aisle width by a couple of feet.

No. 268

WHAT DOOR IS BEST?

We are remodeling an old building and would like your advice as to the best doors for a garage.—Scott Garage, Christian, Ill.

There are so many angles to the door problem that it is hard to say off-hand just what door is best. We suppose you refer to the type of hanging door rather than the door itself or any special opening and closing mechanism.

We would not be in favor of a door that opens vertically suspended on pulleys and counterbalanced unless nothing else could be used; although we have seen these doors used successfully. The sliding door is easily operated by mechanical devices but is very loose and cold in the winter. It cannot be made tight and at the same time easy running. Swinging doors are perhaps the most satisfactory of all but even they have a faculty of swelling up in damp weather and shrinking in the drier winter weather.

If properly made, however, and carefully hung, they should give no serious trouble and will give first class results wherever they can be used. They are sometimes made to divide in the middle, one part swinging on the other like old

IN this department MOTOR AGE aims to assist its readers in their problem of planning, building and equipping service stations, garages, dealers' establishments, shops, filling stations and in fact any buildings necessary to automotive activity.

When making requests for assistance please see that we have all the data necessary to an intelligent handling of the job. Among other things we need such information as follows:

Rough pencil sketch showing size and shape of plot and its relation to streets and alleys.

What departments are to be operated and how large it is expected they will be.

Number of cars on the sales floor.

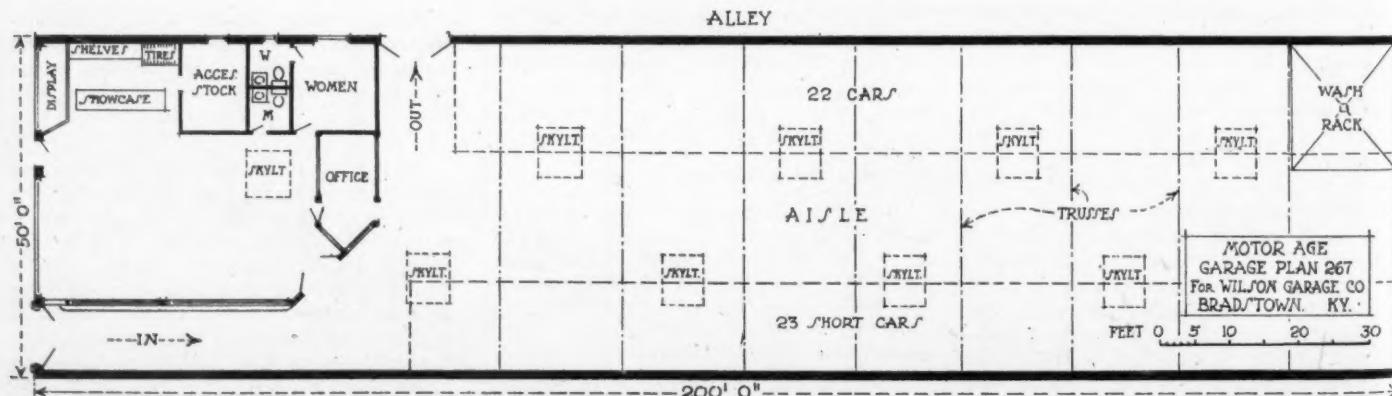
Number of cars it is expected to garage.

Number of men employed in repair shop.

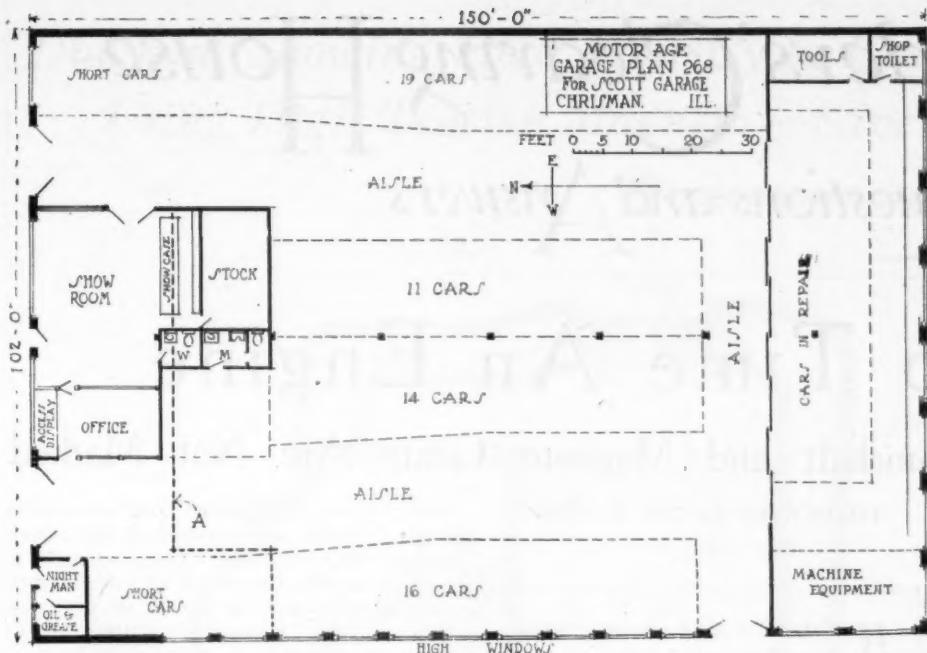
And how much of an accessory department is anticipated.

fashioned blinds so that they will fold back into a small space.

Mechanical operating devices are made in various forms. A very neat and positive one which we have seen, works like a motor car starter. The motor is geared direct to a long screw half of which is right hand and half left hand. The doors are attached to nuts that travel along the screw as it revolves.



No. 267—Skylights arranged for storage building



No. 268—Storing short cars in one section to save space

Dealers Build Village at State Fair

(Concluded from page 21)

pactive purchasers to make a more leisurely inspection and have less interrupted talks with the dealers.

One of the considerations involved in this year's State Fair motor activities was the fact that the fair was held ten days earlier than customary in the last fifteen years. The change was made by the national board of fair managements at the urgent request of the Wisconsin board, which for so many years had run into a chronic season of rain during the second week of September. Whether or not the radical change of dates would affect the attendance or other prime factors was a big question, for the September dates adhered to until this year were originally set to fit in with the farm operating schedules in Wisconsin and to hit a time the largest number of farmers could attend.

Attendance Greater Than Before

It is only necessary to say that the official attendance at the 1920 fair was 327,394, compared with 231,000 in 1919, to demonstrate how beneficial the advancement of dates proved to be. And besides, the rainy season was happily avoided. From the hour the gates opened on Aug. 30, until they closed at midnight, Sept. 4, not a drop of rain fell to mar the fair. Trucktown appeared as spotless on the last day as on the opening hour, barring only a coat of dust.

It is difficult to say how many people visited Trucktown, for no tab was kept on them. But it is conservatively estimated that nearly 60,000 persons passed through the miniature city during the six days of the fair. The paid admissions at the passenger can show amounted to approximately 105,000. One naturally might believe that a free show would

draw more people than one to which admission is charged, but this was not the case.

The reason was that very few women entered Trucktown. It was an interesting study to watch the crowds in the passenger car show. After viewing these exhibits, a party composed of men and women usually separated at the entrance to the truck show, the men going on to inspect the commercial cars, while the women remained to take another look at the passenger vehicles and automotive equipment.

Farmers Show Lively Interest

Of course, Trucktown was not entirely devoid of women visitors. Many farmers' wives passed through and appeared to be as interested as their husbands were in the displays. City folks, however, seemed to fight shy of the trucks.

Besides a city hall, a central police station and a fire engine house incorporated in Trucktown, there was also a motorize-the-farm booth, where a choice collection of attractive literature calculated to sell the farmer on the motor truck idea was distributed. The truck dealers went further than this, however. Every visitor who showed real interest was handed a postal card in the form of a questionnaire, with the admonition that it be filled out and mailed to M. A. D. A. headquarters. These cards have been coming back in relatively large volume in the last few days, and probably the most important information they contain is that the farmers are interested only in the $\frac{3}{4}$ -ton, 1-ton, and $1\frac{1}{2}$ -ton truck. A splendid mailing list and workable prospect list is being abstracted from these replies.

Three years ago the truck was practically unknown as an agricultural vehicle. That was demonstrated by the lack of interest farmers seemed to take in the truck displays at the fair. This year it is safe to say that more farmers manifested real interest in trucks than did any other class of visitors. In the first place, the Trucktown idea was exceptionally attractive. In the second place, the chief interest the modern farmer holds now is in automotive equipment. In Wisconsin, the great dairy state, the farmer is a wealthy man, and from the standpoint of actual truck selling, the Trucktown idea justified itself in every way.

Trucks Have Own Division

The staging of this novel truck exhibit was made possible by the fact that the truck dealers have their own organization within a parent body. Less than a year ago the old Milwaukee Automobile Dealers Association was reorganized as the Milwaukee Automotive Dealers Association and on a division basis, giving the passenger and commercial car dealers distinct representation. Trucktown was the maiden effort of the new truck dealers' division. The entire show, however, was executed by a single joint committee, consisting of William F. Sanger, chairman; A. K. Perego, J. C. Millmann, Robert Leach and H. J. Lear.

Parker Trucks Centered on Three Models

(Concluded from page 30)

Parker models, as many parts, including service brake, are interchangeable on the three models. The engine of the $3\frac{1}{2}$ -ton model has a $4\frac{1}{2} \times 6$ in. bore and stroke and at governed speed develops 43 hp, making a road speed of 16 miles per hour. The low gear reduction is 43.6 to 1. The crankshaft of chrome nickel-steel is carried on four main bearings, the front bearing and the center bearings being each $2\frac{1}{2}$ in. long by 2 in. in diameter and the rear bearings $3\frac{1}{2}$ in. long by 2 in.

Standard Wheelbase 160 in.

The engine is mounted with the three point suspension. The standard wheel base is 160 in. with 150 in. and 180 in. wheel base optional. This standard wheel base permits of a loading space back of the driver's seat of $139\frac{1}{2}$ in.

The springs used on this truck are the Tuthill semi-elliptic type, fully graduated, heat treated and oil tempered, both front and rear. The front springs are 51 in. long, 3 in. wide with 8 leaves, and the rear springs are 60 in. long, 3 in. wide with 16 leaves.

The chassis frame is pressed alloy steel, channel section 7 in. deep with 3 in. flange and of $\frac{1}{4}$ in. stock.

Steel wheels are standard equipment on this model and the tread is the standard 58 in. The list price is \$4,400.

The Readers' Clearing House

Questions and Answers

How To Time An Engine

What to Do if the Camshaft and Magneto Gears Are Not Marked

MANY inquiries concerning valve and ignition timing are received in this department and the diagram and explanation given are to aid the mechanic who has not had sufficient experience with engines and is apt to get them timed wrong when reassembling after an overhauling.

If there are marks on the gear teeth, timing is, fortunately, not a difficult operation but if there are no marks and the engine is down, the job is not so simple. The general method for a four-cylinder engine, let us say, is to get No. 1 piston, the one nearest the radiator, on top center, place the valves in correct relation to it and finally the magneto breaker points position in conjunction with the distributor arm.

Four-Cylinder Engine

The illustration is that of a four-cylinder engine having high-tension magneto for ignition. The arrows show the direction of travel of the various gears and crankshaft, also camshaft. Both valves are closed, though only one can be shown, the intake. Note that the cam has turned so that the valve is closed completely with a slight space between the end of the valve stem and tappet.

Let us assume the engine assembled with the exception of the timing gears and magneto drive, the latter either chain or gear drive. The steps in timing valves and ignition are then as follows:

1—Place No. 1 piston on top dead center. With the head off this can be done easily, otherwise the piston can be brought to the top by aid of a wire inserted through the spark plug hole or valve cap openings.

2—with piston in this position make a prick punch mark on top of flywheel and one on crankcase coincident with it. This is to facilitate timing after the engine is taken down later on. Put 1 and 4 on this mark, which means pistons 1 and 4 are on top.

3—Rotate camshaft in normal direction and watch the movement of the valves in No. 1 cylinder. There will be a time when both valves are closed and farther rotation of the camshaft will cause the exhaust valve to open. This does not happen immediately, for the piston will be on the firing stroke and the valves must be closed for a time. Turn the

CONDUCTED BY ROY E. BERG

Technical Editor Motor Age

REPAIRMEN and dealers would do well to cut out the opposite page and tack it up in their garages for future reference. While the diagram is for a four-cylinder engine using high tension magneto, it can be adapted to other engines as well. The diagram shows the relative positions of the piston, valves, distributor and magneto points at the instant the spark occurs when the spark lever is in the retarded position. It is for No. 1 cylinder.

camshaft back to where the exhaust and inlet close completely, with the cam of the inlet in the position shown.

4—Slip the camshaft gear on to mesh with the one on the crankshaft. If a chain is used, it should be put on, keeping both crankshaft and camshaft in the proper position. Valves are now timed right, for if one cylinder is all right the rest follow, because the cams are integral on the camshaft.

The Fifth Operation

5—Get the magneto in the right position. Revolve the armature shaft by hand until the breaker points are about to separate. This takes place when the fiber block on the end of the bell crank comes into contact with one of the cams on the inside of the interrupter housing.

6—Remove the cover of the distributor housing and note the position of the distributor arm. If it is on segment 1, it is in the correct position, otherwise the magneto will have to be turned over again.

7—Retard the spark fully.

8—Keeping magneto in this position, slip the gears in place so all mesh properly, as shown in the diagram.

While the diagram shows the timing positions for a four-cylinder job with magneto, it can be used for other engines and types of ignition systems as well. The repairman should bear in mind that the essential thing is to get the first cylinder piston set right with the valves and then get the spark position for it

with the spark retarded. On some jobs better results are secured if the spark is not fully retarded. Then when it is fully retarded, the spark will occur with the piston about $\frac{1}{4}$ in. or so past top center. This is especially suited for engines that have to be cranked by hand.

The firing order of the engine shown is 1-3-4-2, but this can also be 1-2-4-3, in which case there will be a different arrangement of the wires going to the plugs. Sometimes setting the timing gears one tooth one way or the other after timing will give better running. Be careful in this respect with engines that are marked. If you have the right timing as shown by the punch marks, let it go at that, as most of the timing gear teeth are too coarse to allow setting the camshaft one tooth too much, the engine either not throttling down or else running with apparent loss of power.

ALUMINUM PISTON DISCUSSION

Q—What advantage is there in an aluminum cylinder head and an aluminum piston in an engine. I always maintained that an aluminum piston was not as good as other pistons.—H. S. Deal, Winston-Salem, N. C.

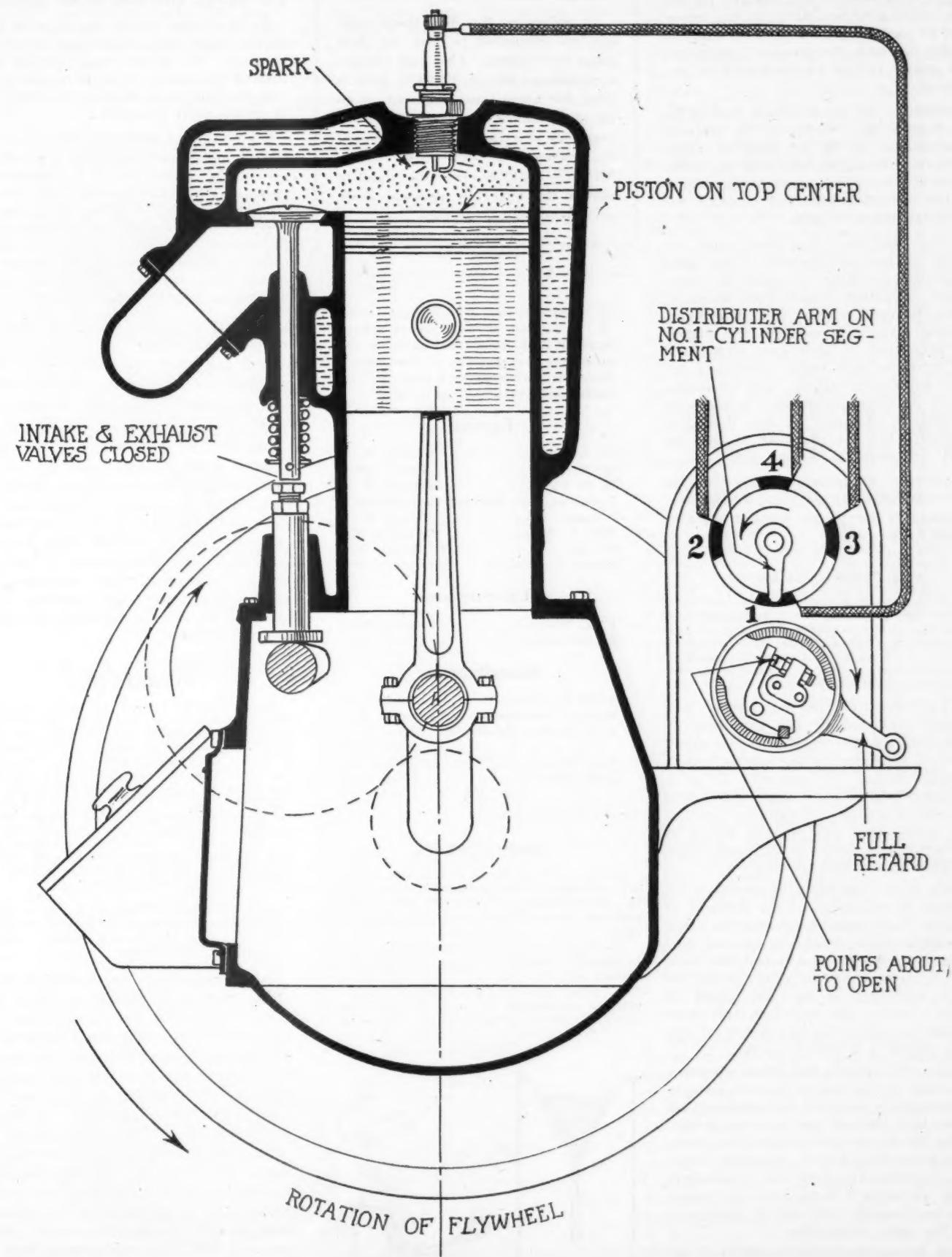
There are probably just as many on your side of the fence as there are on the other when the aluminum piston is the subject. It has been stated by authorities that the progress made in aviation during the World's War would never have been possible had it not been for the aluminum piston. The high power developed by the giant aircraft engines brings several disconcerting factors which are extremely hard to combat.

One is an excess of heat. If this heat is not disposed of or dissipated the engine will burn up. Preignition will follow after limited periods of operation. An iron piston does not transmit heat as rapidly as an aluminum one, hence should these large aircraft engines have been fitted with iron pistons the power available would have been much less.

Another important consideration is the weight of the reciprocating masses. It is proper to consider the piston, the piston pin and one-half the weight of the connecting rod as reciprocating masses. A rotative mass can always be properly balanced but a reciprocating mass produces a vibration difficult to eliminate and compensate for.

Designers of steam railway locomo-

Diagram Showing How Four-Cycle Engine is Timed When Using High Tension Magneto—Save This Instruction.



tives have gone so far as to state that the best balancing practice is to balance all rotative forces and a small part of the reciprocating forces and to let the rest go. It simply is not expedient to attempt the balancing of reciprocating weights with rotative weights and should other reciprocating weights be introduced to compensate for the real existent weights serious mechanical complications would follow which would be impractical.

Therefore, the most logical procedure is to reduce the weights of the reciprocating masses as far as possible which will reduce the extent of the inertia force and consequently reduce vibration. These are the advantages gained through the use of aluminum pistons.

In the past there has been much objection to their use because when fitted a clearance too large to permit the satisfactory operation when first warming up was necessary. But, now, that much is being learned concerning the expansion properties of aluminum alloys and new formulas are being developed for more successful alloys, this objective feature is being overcome. A story of the success obtained by one manufacturer with the use of these pistons recently appeared in MOTOR AGE.

Regarding aluminum cylinder heads what was said with regard to head dissipation for the piston applies equally as well here.

BEARING WEAR

Q—Which causes the wear to the connecting rod bearings, the blows from the explosion or the centrifugal force of the reciprocating parts with the exhaust stroke? 2—Which of the above pounds the crankshaft out of round?—M. M. Clark, Temple, Okla.

1—The wear on the connecting rod bearings produced by the explosion of the engine is imperceptible as compared with that produced by the inertia forces produced within the engine. It is a surprising fact to many upon examining a bearing of a high speed engine that the lower connecting rod bearing which is the bearing cap wears much faster than the upper half of this bearing.

While it is true that the pressure on the head of the piston at the moment of explosion may amount to 5,000 lbs., this tremendous force would be exerted momentarily only and would last for such a brief interval that its effect would be hardly sufficient to set the piston in motion. After the force of this first pressure is spent the remainder of the power stroke is a gradual push.

During the exhaust the piston operates against no pressure and its movement is first that of acceleration and deceleration on the last half of the exhaust stroke. During the deceleration period the piston being unchecked by no opposing force tends to run away from the crankshaft and in so doing a large force is turned upon the bearing cap which makes it wear the faster of the two.

2—It is the inertia force which is destructive, not the force produced during the power stroke.

THIS department is conducted to assist Dealers, Service Stations, Garagemen and their Mechanics in the solution of their repair and service problems.

In addressing this department readers are requested to give the firm name and address. Also state whether a permanent file of MOTOR AGE is kept, for many times inquiries of an identical nature have been asked by some one else and these are answered by reference to previous issues. MOTOR AGE reserves the right to answer the query by personal letter or through these columns.

TO assist readers in obtaining as a unit all information on a certain subject, MOTOR AGE segregates inquiries in this department into divisions of allied nature. Questions pertaining to engines are answered under that head and so on.

Engines

H. S. Deal.....	Winston-Salem, N. C.
M. M. Clark.....	Temple, Okla.
R. M. Rolfe.....	Washington, N. C.
J. Gabriel, Shop Foreman, Bates Avenue Garage	St. Paul, Minn.
Tom C. Wilson.....	Hawesville, Ky.
W. K.	Milwaukee, Wis.
Walter L. Robinson.....	Fort Worth, Tex.

Carburetion

R. M. Wilson.....	Edwards, Miss.
R. Holzmeister.....	Salina, Kans.

Miscellaneous

Alfred S. Hooker.....	Chicago
Herman Hokemueller.....	Milwaukee, Wis.
A. D. Stuehm, Square Deal Garage.....	Potone, Ill.
Yosio Ogawa.....	Highland Park, Ill.
Earle Elithorpe.....	Tulsa, Okla.

PISTON OFFSET

Q—Is a Buick H-45 and Hudson Super six equipped with pistons having off-set to counterbalance side-thrust? If so, publish diagram showing installation of same.

2—What does the arrow indicate which is stamped inside of the piston below the piston pin boss?

3—What will be the result of using one pint of turpentine to every five gallons of gasoline about every thirty days in a

Buick H-45?—R. M. Wolfe, Washington, N. C.

1—In the July 22 issue of MOTOR AGE there is an explanation and diagram showing the offset of the Buick pistons which will apply to this model as well. The Hudson also uses off-set pistons.

2—The arrow which you refer to has a curved stem and when the installation is made, the arrow head should point toward the front. This is to aid in getting the piston set so that the offset will be in the right direction.

3—We cannot state just what the result will be but at any rate there is absolutely no call for its use and will not advocate using it. We will assume that you believe that this will act as a carbon remover. If your engine is properly cared for, the right amount of lubricating oil used, and the carburetor properly adjusted, there is no reason why you should be bothered with carbon deposit.

The writer drove a Buick D45 for 10,000 miles before the carbon was removed and when the engine was opened up there was very little carbon deposit and the spark plugs were in very good condition.

Gasoline as it is today is not being handled very efficiently and it is certain that the addition of a lower grade material will not improve conditions. If the spark plugs are fouling and there is excessive carbon deposit that accumulates in a very short period of time, we advise examining the mixture, the amount of oil used and checking up to see if the pistons are not worn and pumping oil.

OVERHEATING

Q—A 1911 Overland 42 runs very hot. The water gets so hot that the radiator cannot be touched but it does not boil over. A gallon of water will evaporate in 8 hours. The engine will stop after the switch is thrown off. The carburetor has been adjusted as fine as possible, the ignition was also checked up and found O. K. The engine after warming up smokes even after new oil rings were put in, this is more noticeable on a hard pull. Would you suggest cutting off intake manifold so as to bring the carburetor closer to top of cylinders?

2—Where can we obtain a list of interchangeable parts for different cars?—J. Gabriel, Shop Foreman, Bates Avenue Garage, St. Paul, Minn.

Overheating may be caused by many things and as a rule is a result of a combination of factors rather than any one factor. The first thing to do in the case of overheating is to see that the fan belt is tight and is functioning properly. Examine the cooling system carefully and it will prove profitable to flush it out thoroughly. Lack of lubrication will often cause very serious overheating. Since you have made an examination of the carburetor setting and the ignition timing and found them to be correct it must be from some other source. We do not see how you can assume that the engine is overheating and still the engine fails to boil the water. Furthermore it

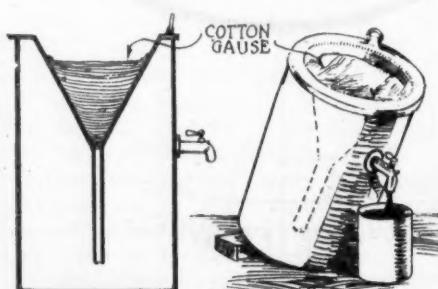


Fig. 1—A simple filter

does not seem reasonable to think that one gallon of water will evaporate in this time without any of it boiling away. As long as the car operates satisfactorily we see no reason why you should worry because the water gets so hot that you cannot hold your hand on the radiator. As a matter of fact the hotter you can operate a gasoline engine and still get all of the desirable qualities the more efficient it will run.

If the engine smokes excessively it is a pretty good indication of either too

rich a mixture or the pistons are pumping oil. If this is the case it will be necessary to regrind the cylinders and fit oversize pistons and rings. If the car is not operating satisfactory its running condition will probably be improved by shortening the manifold so that the carburetor will be closer. With a long manifold there is good opportunity for condensation which usually results in what is known as manifold loading. However if the engine is running entirely satisfactory it is advisable to leave it as it is.

—So far as we know there is no such list published.

STARTING AN ENGINE

Q—In your issue of Aug. 5, in answer to question asked by Elmer M. Young, of Weatherly, Pa., you state that a Ford car can be started in reverse gear by drifting down a hill backward, and I would like you to explain just how this can be done. Tom C. Wilson, Hawesville, Ky.

The engine can be started providing the car will drift down the hill when in reverse. We do not believe that the car will move at all when thrown in reverse unless the hill is extremely steep or if the car is towed. However, the logical position for the gears if you wish to start an engine by means of the rear wheels is in high gear or the position which comes the nearest to giving direct drive. The fact that reverse gear gives a high gear ratio means that for every revolution of the rear wheel the engine will have to turn over several times. Because of this ratio it is very likely that it will be impossible to secure leverage enough to turn the engine over in this manner unless some exterior force such as towing is used. The conditions would apply if an attempt was made to start the engine when the car was in low gear because the ratio would be so great that it would be impossible to turn the rear wheel.

ENGINE KNOCKS ON GRADE

Q—Have worked on a 1916 Oldsmobile model 43 which has a knock when climbing a grade or hill, also when suddenly opening throttle. We cleaned the carbon out of engine, ground valves, bearings and pistons have been carefully examined, have also advanced rotor in timer, but knock remains. Have also set the rotor in the timer back but the engines does not pull then and overheats.—W. K., Milwaukee, Wis.

This may be due to too lean a carburetor setting. If the mixture is so lean that it will operate to a better advantage at high speeds it will be much too lean to give good idling conditions and if the throttle is opened suddenly a knock will result. It would be advisable after checking the carburetor setting to make a careful examination of the timing gears. Often knocks of a serious nature develop as a result of too much backlash in the timing gears. It is also very possible that it is a fuel knock.

CYLINDER REPAIR

Q—I am trying to find a good mixture for repairing scored cylinders. Can you suggest what is the best kind of metal and acid to use on this kind of work and where I can obtain same.—Walter L. Robinson, Fort Worth, Texas.

We cannot give a set formula for the metal or flux to be used in repairing scored cylinders as the successful compounds that have been used are all patented. However, the materials for use in doing a job of this kind can be obtained from any of the following concerns: Transmuted Metals Co., 3334 Chicago Ave., Chicago; MacKenzie-Waterhouse Co., Inc., 717 E. Pike St., Seattle, Wash.; Lawrence & Co., Newark, N. J.; or the Eagle Machine Co., 24 N. Noble St., Indianapolis. The last two mentioned processes are patented but may be licensed from the manufacturers.

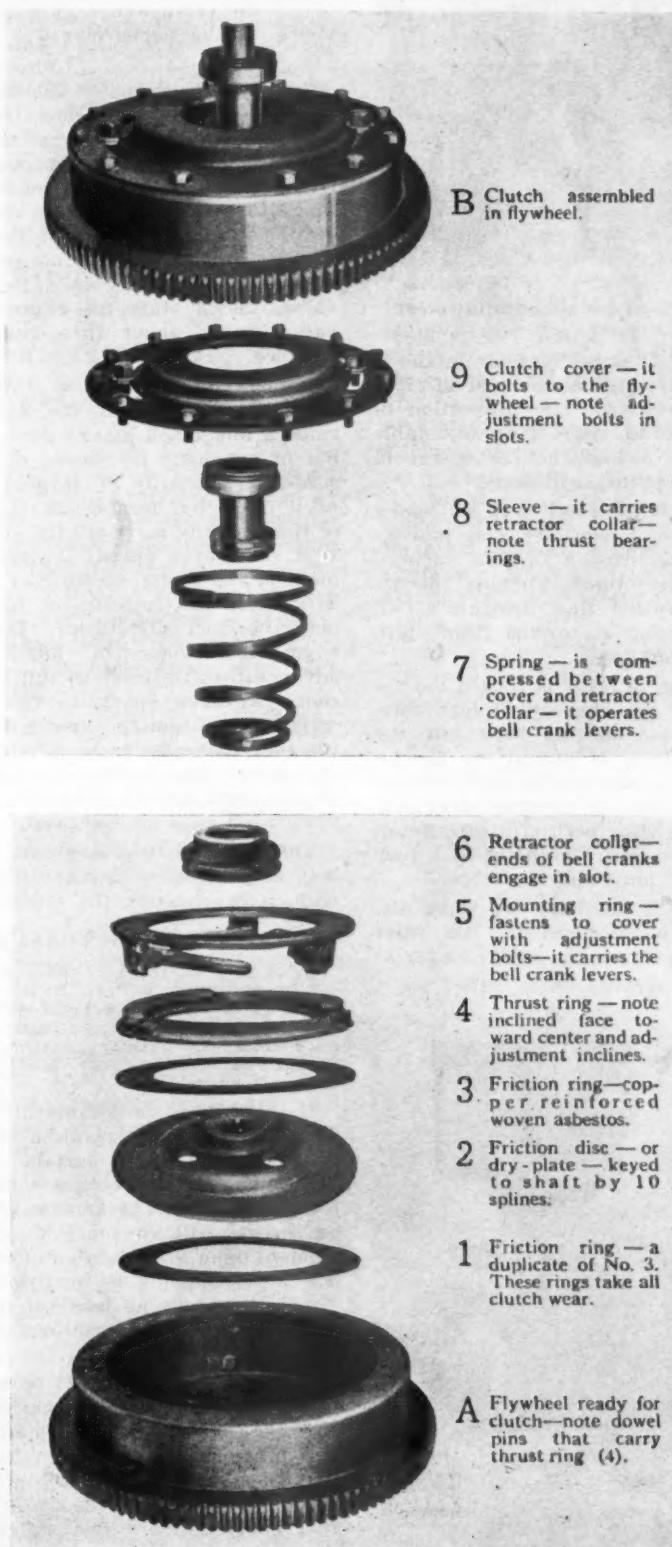


Fig. 2—An exploded view of the Borg and Beck clutch

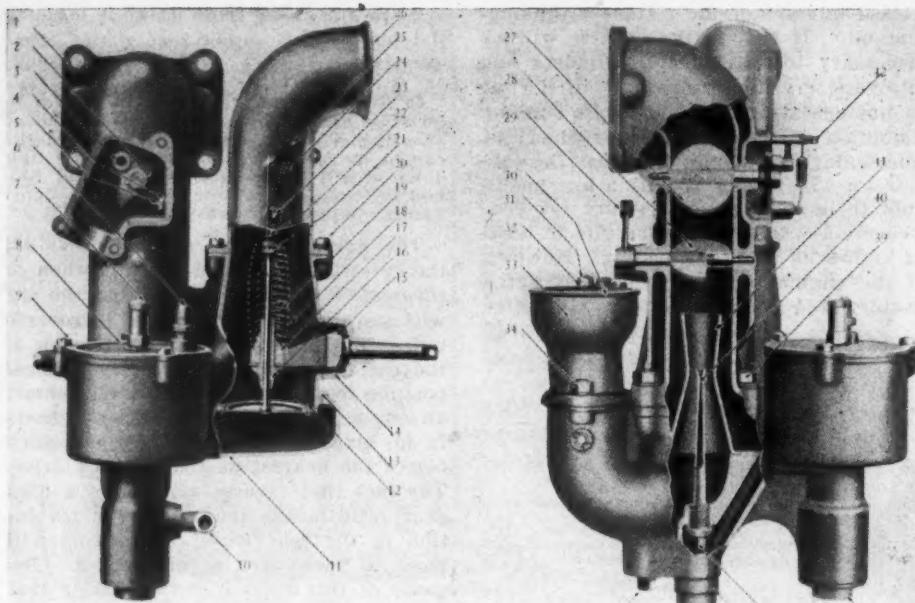


Fig. 3—Two views of the Packard truck carburetor showing points of adjustment

Carburetion

CARBURETER ADJUSTMENTS

Q—Explain the adjustment of the carbureter on a Packard truck and give possible reasons for its failure to work properly.

2—Explain adjustment of the carbureter on Holt tractor.—R. M. Wilson, Edwards, Miss.

1—The Packard company does not advocate the adjustment of the carbureter but advise consulting the Packard dealer. Before adjusting the carbureter it is advisable to make an examination to see whether the faulty action of the engine which you are attributing to poor adjustment of the carbureter is not caused by some other factor. As far as the engine itself is concerned the first thing to look for if the ignition is functioning properly is leaking joints of the intake manifold or perhaps leaks around the spark plugs. As far as the gasoline system itself is concerned it might be well first of all to investigate the condition of the pressure.

On the dash there is a gage connected directly with the gasoline tank, independently of the pumping system, which shows the air pressure in the tank. If the indicator on the gage shows that the pump is not maintaining the proper pressure in the tank, inspect gasoline tank filler cap to make sure that it is screwed on tight. See that the gasket and seat are in good clean condition and free from nicks. See that the relief valve in pump body is working properly. A good method of locating leaks in the air line is to put pressure in the tank and go over the line carefully with soap suds.

The gasoline tank may be easily flushed out by opening the drain plug on the bottom. If it is desired to clean the gasoline and pressure pipes, it can be done by disconnecting the pipes at the unions.

The gasoline level in the float chamber should be $\frac{1}{8}$ in. below the top of the

spray nozzle. The primary air intake is around exhaust pipe at the rear of right side of the engine. The proportion of warm and cold air may be an adjustable valve located behind the carbureter in the primary air intake passage.

The auxiliary air valve is in a housing at the rear of carbureter and is controlled by the tension of two springs, one within the other. Turning the air valve lever toward "Gas" provides a rich mixture; turning it toward "Air" provides a lean mixture.

If the air valve lever is turned too far toward "Air" the consequent lean mixture may cause spitting back into the carbureter. If it is turned too far toward "Gas" the consequent rich mixture may cause irregular running, overheating. When spitting occurs in carbureter, move air valve lever one notch at a time toward "Gas" until spitting stops.

To adjust the auxiliary air valve disconnect the clevis from the air valve wedge stem, pull out the wedge as far as

it will go. With the wedge in this position the outer air valve spring should just bring the valve firmly to its seat. Adjust the lower pair of check nuts on the air valve stem so that the valve may be depressed $7/32$ in. before the lower nut comes into contact with the top of the inner air valve spring and lock in this position. Place the air and gas lever on the control board three notches toward air from the center position and adjust the connecting rod clevis to connect with the air valve wedge when the notch in the stem is flush with the end of the air valve wedge guide. Sectional views of the carbureter are shown in Fig. 3.

2—A $1\frac{1}{2}$ in. Schebler Model A special type is used on the Holt tractor, see Fig. 4. To adjust the carbureter first let the engine warm up thoroughly. Then open the gasoline needle marked "Running" four turns. Then the one marked "Idling" four turns. Open the gasoline throttle such an amount only as is necessary to slightly open the butterfly valve. Then start the engine and advance spark about three-quarters full advance.

Adjust for idling first. Adjust the "Idling" needle until the engine runs smooth and black smoke does not come out of exhaust. By means of adjusting screw on butterfly or throttle shaft in back of carbureter, adjust the position of the butterfly valve till the engine runs at a slow, even speed. Further adjustment of the idling needle may be necessary after this adjustment in order to obtain perfect adjustment. Do not idle engine below 200 r.p.m. For high speed, advance throttle lever to full open position. Advance spark to full advance. Adjust the "Running" needle downwards till the engine "pops back" through the carbureter, then increase in full till the engine runs smooth, has the necessary power and does not overheat.

The ideal mixture to obtain is one as lean as possible with correct power and without overheating the engine.

EXCESSIVE FUEL CONSUMPTION

Q—A 1917 model, 6-cylinder Studebaker car is equipped with a Schebler carbureter. The car runs normal with the exception that it uses too much gasoline regardless carbureter settings. How would you remedy this?—R. Holzmeister, Salina, Kansas.

If there is no noticeable difference in fuel consumption regardless of the carbureter setting it is certain that there are other factors which are responsible for the trouble. The amount of fuel that an engine will consume is largely dependent upon the condition of the engine. The valves should be seating perfectly. There should be no leaks at any of the connections of the manifold or around the spark plugs.

The compression should be up to normal. The ignition system should be working faultlessly. As a matter of fact it is possible to go over practically every part of the car and point out possibilities of trouble which results in excessive fuel consumption. The statement that the engine uses too much gasoline is rather indefinite and we do not quite

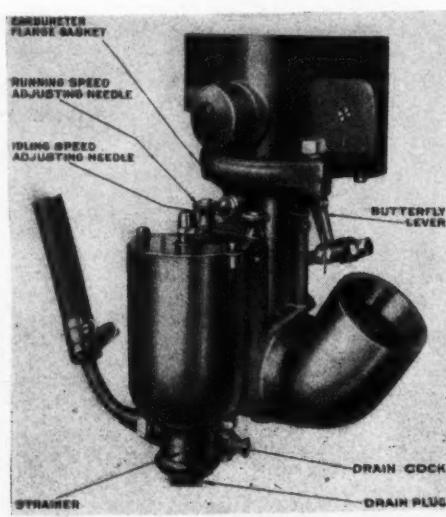


Fig. 4—Special Schebler Model A carburetor used on the Holt tractor

understand just what you are basing this fact on.

It is very logical to believe that there are fuel losses taking place due to condensation in the intake manifold. If the manifold is very long and there is no means of heating the mixture there is really a flow of liquid taking place all of the time. This means that some of the liquid is going to work its way past the pistons and down into the crankcase.

As long as the car is working perfectly alright we see no way in which you can cut down the fuel consumption except by means of the carburetor setting. It might help some to get a new one and install a hot spot. J. Losee of Hebron, Ill., is manufacturing a hot spot which we have seen in operation on a very long manifold that gave very efficient and satisfactory running and enabled throttling a car down to a very low speed.

Miscellaneous

R. C. H. TRANSMISSION ADJUSTMENT

Q—Explain and illustrate how to disconnect and adjust the transmission on a 1914 R. C. H. car.—Alfred S. Hooker, Chicago.

This car is no longer in production and it is a very difficult matter to obtain any information. Our files are without illustrations or details concerning the transmission. The transmission is located at the rear, making a unit with the rear axle and is very similar in construction to the transmission used on the Studebaker car. Fig. 5 shows the Studebaker transmission.

To determine whether an adjustment is necessary or not, push the universal back and forth and if the shaft shows play where it enters the gearset case, it indicates that the roller bearings need taking up. On this transmission the operation is performed through the pinion shaft adjusting nut.

This nut is locked by a pawl and the pawl, in turn, is locked by the lock bolt which holds the adjusting nut. Loosen the nut on this bolt and the pawl can be removed from the adjusting nut. To make the adjustment, turn out the adjusting nut until the play between the shaft and the gearcase disappears. It is not necessary to draw the nut up excessively tight.

When the operation is completed, lock the units in the inverse operations by which they were unlocked. The transmission which you have may not be provided with identically the same adjustments but will be of similar construction. It is very probable that the bearings are badly worn and perhaps the gears are worn. If the bearings cannot be taken up it will be necessary to replace them.

NOISY CLUTCH

Q—The Borg and Beck dry plate clutch on a 1920 Willys Knight Sedan when disengaged and the car left in gear makes a growling, chattering noise similar to a dull noise made when setting a brake.

The disk in the clutch had been replaced which eliminated the noise now after about 500 miles the trouble has again developed.—Herman Kokemueller, Milwaukee, Wis.

Noise may develop at three points on the thrust ring where it is driven by the dowel pins in the flywheel, because the pins were not properly fitted in installation and the backlash causes wear in the slots of the thrust ring. To correct this, take down the clutch and replace the dowel pins of proper fit for the thrust ring slots. Improper lubrication will cause the retractor collar bearing or throwout bearing to become noisy. To correct, open up the oil holes in stem gear shaft, replacing the bearing if found worn. These bearings may also become noisy if the bearing seat on the clutch sleeve is allowed to get out of line or if the stem gear shaft is out of line. This sometimes occurs from hasty installation or from bad alignment of the throwout yoke. The bearings should be straightened on the sleeve and the clutch pedal yoke should be set to bear evenly on the throwout bearing. In your case it is possible that the drive disk is warped again due to overheating from slipping the clutch. One thing to remember when driving the car is to keep your foot off of the clutch pedal because continual slipping of the clutch will ruin it in a very short time. Regardless of how careful you may be if you travel over a stretch of rough road your foot will move up and down enough to cause a continual slipping of the clutch. Fig. 2 shows the clutch used on this car.

OIL FILTER

Show a cheap method of filtering oil.—A. D. Stuehm, Square Deal Garage, Peotone, Ill.

Fig. 1 shows a method of filtering oil which will prove very satisfactory. It

is only necessary to provide a retainer and filter the oil through several thicknesses of cotton gauze, or cheese cloth or even sawdust. It must be remembered, however, that this will only remove dirt and its condition of dilution will be identically the same. If the oil has been used in a crankcase for any considerable period of operation its use after filtering will be very limited unless the gasoline which has accumulated is driven off by applying heat.

ANTI-FREEZE SOLUTION

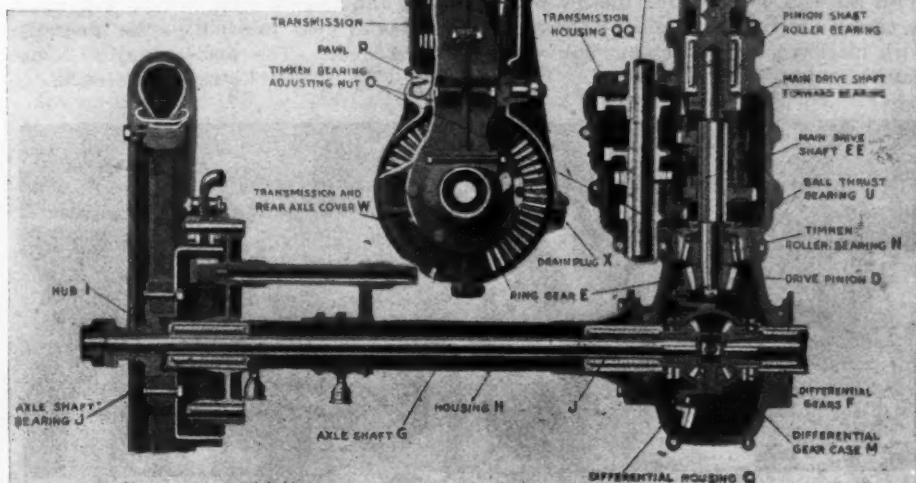
Q—Is it practical to use kerosene in radiator in place of water and is it efficient from an anti-freezing point?—H. E. Quinlin, Billings, Mont.

Although kerosene has been used to some extent as an anti-freeze solution and is claimed to work quite satisfactorily yet there are several objections to its use. Kerosene has a lower freezing point and a higher boiling point than water, the boiling point being about 350 deg. Fahr. and the kerosene will solidify at about 50 deg. centigrade.

From a fire hazard standpoint the flammability of its vapor makes it dangerous to use. The high and uncertain boiling point might lead to serious overheating of the engine, or even to the melting of the solder in the radiator. It has a marked solvent action on rubber which means that the hose connections will be destroyed which is, of course, a very small item.

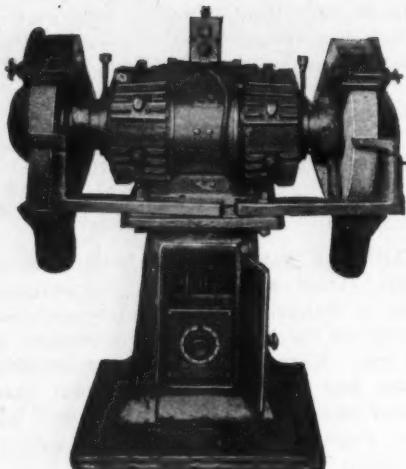
We do not advocate the use of kerosene for the above stated reasons. There is one other objection and that is the formation of water in the kerosene which may result in freezing up the pump.

Fig. 5—Rear Axle and transmission unit used in the Studebaker, which is similar to that used in the R. C. H.



Service Equipment

Time Savers for the Shop



U. S. tool grinder

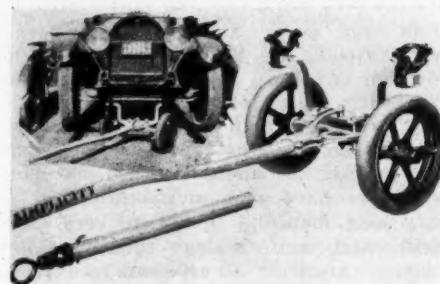
Motor Driven Tool Grinder

The motor driven tool grinder, illustrated herewith, has just been placed on the market by the U. S. Tool Co., of Cincinnati, and embodies the features of ease of starting and total enclosure of motor and control apparatus. The grinder is equipped with a 5 hp. direct-current shunt-wound adjustable speed 1120 to 1600 r.p.m. 230-volt Westinghouse motor, started or stopped from a push button on the top of the motor frame. This push button actuates a type C Westinghouse starter with a speed adjusting rheostat all of which are located in the bottom of the machine frame.

The reason for mounting the push button on the top of the motor frame is that on previous machines of about the same type, these push button stations were mounted directly in front of the motor frame, and it was found that the workmen in using these grinders would start the motor by jabbing the button with the material which they intended to grind. With the new position for the buttons it is easier for the workmen to operate it with his hand than with the tool, which naturally prevents misuse.

Simplicity Ambulance

The Simplicity Ambulance, shown herewith, is a piece of service equipment that can be used to great advantage around the service station as well as in towing cars. It is built so it will "cradle" the differential housing when it is used under the rear axle. Adjustable clamps which will fit any axle are provided to insure secure fastening. Solid rubber tire wheels eliminate rattle and noise and allow towing safely at increased speed. The axle is 1½ in. in diameter, the tires are 16 by 3. The shipping weight of this device is 210 lbs. It is manufactured by the Interstate Mfg. Co., Milwaukee.



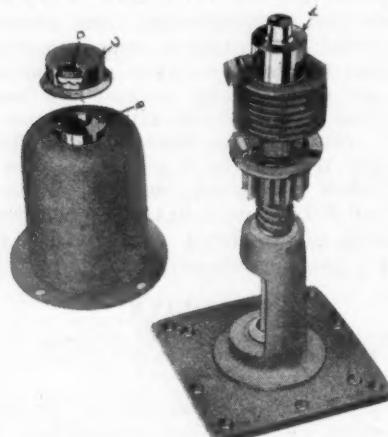
Simplicity ambulance

Stiles Fender Straightener

The Stiles fender straightener consists of an adjustable yoke, constructed from two malleable iron arms, hinged and slotted as shown in the illustration, and through which the tension adjustment bar passes. By means of this tension bar the distance or spread between the arms is controlled and operated on the principle of an arbor press. To the free ends of the arms are fastened by means of set screws, suitable formed rollers and attachments; the outfit including a variety of shapes and sizes of rollers and attachments, each suited for a given purpose.

In operation the straddle block arm attachment is so placed over the fender that the concave side of the dent is on the same side as the straddle block. The proper roller attachment is placed on the other arm and as the tension bar is tightened gradually, the roller is pushed back and forth across the bent place and the dent forced up.

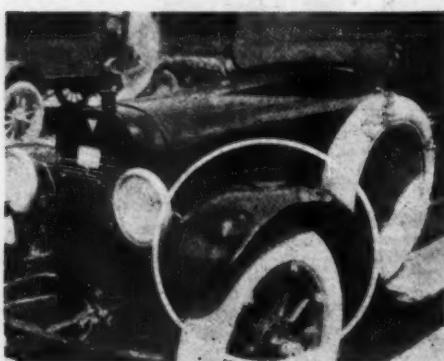
This ironing out process is conducted with first one roller and then another until the fender is restored to its original shape. A device of this kind will be found of great advantage in any service station and will enable the repair of doors, bodies, cowls, fenders and etc., with practically no loss of use of the car. This fender straightener is manufactured by Stiles Mfg. Co., St. Louis. The price is \$40.



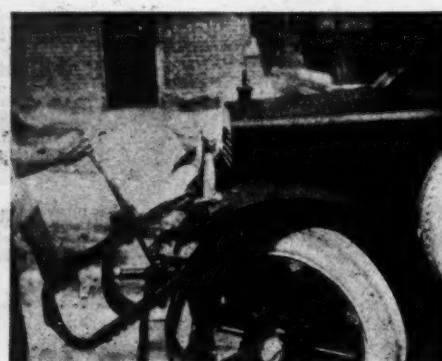
Starting motor extension bearing

Starting Motor Extension Bearing

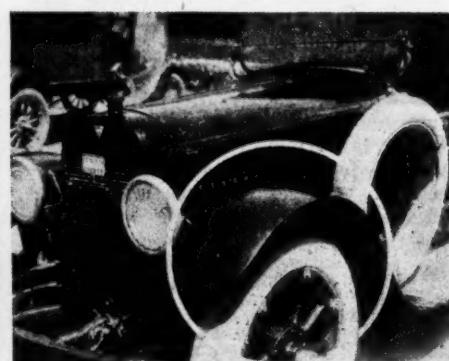
The Nance starting motor extension bearing is claimed to eliminate the trouble caused by the small pinion gear sticking in the flywheel gear. The Ford starting motor has a small non-supporting shaft. Constant pounding in of the Bendix may cause the shaft to become bent and out of true, which will cause the small gear to stick in the large flywheel gear. The price is \$10. Nance Mfg. Co., 1348 N. Clark St., Chicago.



Damaged fender to be repaired



Stiles fender straightener in operation



Restored fender

The Accessory Show Case

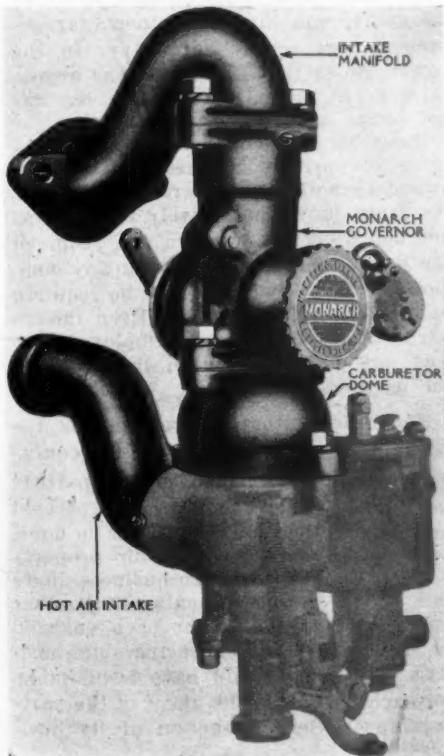
New Fitments for the Car

Monarch Governor for Dodge Bros. Trucks

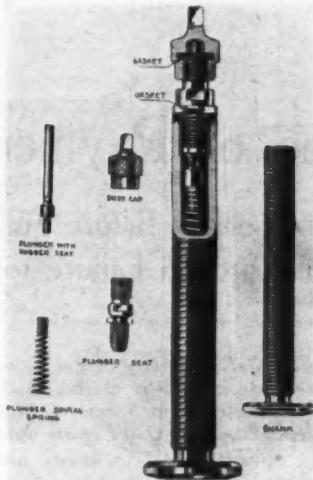
This governor operates on the vacuum principle and embodies all the standard Monarch Governor features. The complete equipment consists of four parts: a special intake manifold, carburetor dome, hot air intake, and standard Monarch Governor model D-4. The new intake manifold is substituted for the one on the car and the Governor bolted to it. The special carburetor dome replaces the standard Dodge carburetor top. When the carburetor is connected to the governor, the throttle rod is attached to the lever on the side of the governor. Installation is simple and requires but a few minutes work with a wrench and screwdriver. It is manufactured by the Monarch Governor Company, Detroit, Mich., and the price complete is \$30.00.

Mead Air Valve

The Mead air valve, shown herewith, is claimed to be an air-tight valve invented by Lieut. Mead. It consists of five separate parts namely—the shank, the heavy brass spiral spring, plunger with rubber seat, plunger seat and dust cap. All of the parts are made of brass heavily nickelized over to prevent corrosion.

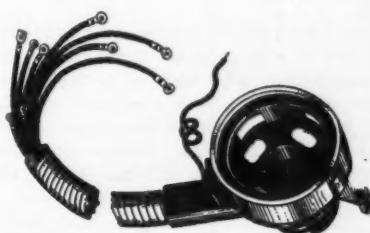


Monarch governor for Dodge Brothers Trucks



Mead air valve

Instead of the solid construction, the plunger seat on the Mead valve is removable. It screws into the top of the shank. If the motorist inadvertently strikes the top of the valve to aid in putting on or taking off the tire and injures the valve top, which is, however, improbable in the case of the Mead valve because of the sturdy construction, all the tedious job of putting in a new valve is unnecessary, as all the Mead



Sure-fire commutator for Fords

valve parts are standard and all that has to be done is to purchase a new plunger seat at small cost; and put it in, in place of the injured one.

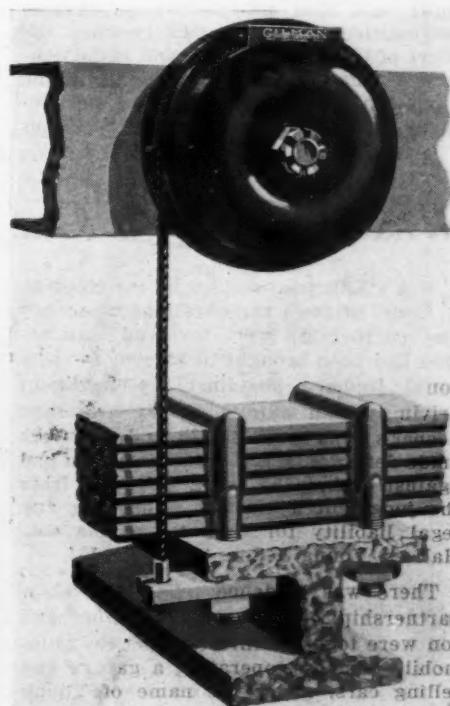
The plunger is held in position by the beveled shell or plunger seat which screws into the shank. The heavy brass spring precludes any possibility of any air escaping through the valve. No air can get out until the plunger is pushed down far enough to bring the port holes out of the conical shell, whence it escapes through the two air port vents. The moment the pressure is released the spring immediately pushes the plunger back into the conical boring and it remains hermetically seated until deflation is again required. Any further information may be obtained from the offices and demonstration plant of the Mead Universal Co., Lt., at 124 West King St., Toronto, Canada.

Gilman Shock Absorbers

The Gilman Shock Absorber, shown herewith, is claimed to control the spring recoil the full distance of its travel. The claim is also made that it offers no restraint to the downward or contracting movement of the spring but smoothly checks recoil at every stage. The illustration clearly shows the method of attaching it to the car. The gripping effect of band upon drum can be increased or decreased as desired by means of an adjusting device, with a screwdriver. Turning to the right increases the tension; to the left, decreases it. The main bearing is self-oiling, being made of a lubricant-impregnated wood. This absorber is manufactured by Gilman-Davis Mfg. Co., 224 S. Michigan Ave., Chicago.

Cook Sure-Fire Commutator for Fords

All wires on this commutator are enclosed and brought to the top to keep them away from water and oil. There is both a double wiring and a double wipe brush system. These precautions are said to insure a good spark being obtained under all conditions. The commutator is manufactured by the Cook Sure-Fire Commutator Co., 4103 New Utrecht Avenue, Brooklyn, N. Y.



Gilman shock absorber

Jaw in Your Business

By Wellington Gustin



Agent Must Fix Time of Payment on Sales Contract

If the Buyer Resells the Car Before Fully Paid For, the Seller Has No Claim Through Failure to Set Time Limit

A pointer for the seller of motor cars is found in the case of Ford Motor Co. against Maeder, recently decided by the Supreme Court of Wisconsin. The sales contract was filed, purporting to be a conditional sales contract, reserving title to the car in the seller until full payment had been made. A bill of sale was attached to the contract as filed.

The buyer resold the car and the first seller brought replevin to recover the car, claiming title according to the contract and bill of sale. The facts showed that neither in the contract nor the bill of sale, as recorded, was the time for payment specified, and the court said there was no way of ascertaining the time of payment.

The notice given by filing such contract is limited by statute to one year after the time fixed for payment of the purchase price or for the performance of the other conditions of such sale. The court said that prospective purchasers are entitled to know definitely when the effect of the filing expires, and if the contract is silent as to time of payment the filing can give no notice to any one because it does not comply with the statu-

SEEMINGLY knotty legal problems are constantly arising in the dealer's business, which even a slight knowledge of the law easily may solve. MOTOR AGE presents here the most common legal problems which confront the dealer. Mr. Gustin, a member of the Chicago bar, not only is well versed in the law relating to the dealer, but presents it in such a way as to be readily understood by the layman. In addition to his articles, Mr. Gustin will gladly answer such individual inquiries on knotty problems as may be submitted to him.

tory requirement of fixing the time of payment, and hence is not entitled to filing.

Here was a clear conditional sale contract but it was void as against the second purchaser, who had no actual notice of the contract. The contract as filed could give no notice to him since it was not entitled to be filed. Hence judgment was given against the original seller who attempted to reserve the title.

time of the accident, and that such use was only in behalf of the driver. This was also corroborated by the driver, and being uncontradicted was held sufficient to reverse the judgment that the driver was acting as agent, servant or employee for the garagekeeper. The court further held that the evidence did not sustain the finding that the driver, while driving the car, was transacting some business of the partnership between himself and defendant or was engaged with him in a common enterprise. It could not be said that what the driver did had any connection with the business of the garage, or with anything in which the father and son were engaged in. The father had no knowledge of the son's trip that resulted in the accident until he heard of the collision.

The most that could be said, declared the court, was that the father (garagekeeper) was owner or partner in the ownership of the car. If he was owner, he was not liable, since the driver was not acting as his agent and had the car without his consent, and was employing it in his private business. If it was owned by both as partners or otherwise, the facts show conclusively that it was not being operated within the scope of the partnership business or in any common enterprise, which would be required to make them both liable. Even though partnership property was employed, this was not employed within the scope of the partnership business.

The rule is that one partner is the agent of the other, and, if in the course of the partnership business one partner commits a wrong, the other may be held in damages therefor, but if this is done, even in the use of partnership property without the scope of such business, there can be no recovery against the other partner. Had the driver been engaged in the transaction of partnership business, the other would have been liable, for each partner is the agent of the partnership in the transaction of its business.

It is obvious that judgment against the father was reversed.

What is Liability of One Partner for Acts of Other

IN A CASE just decided by the Supreme Court of Iowa the questions of agency and partnership were involved. An action had been brought to recover for personal injuries sustained by negligent driving of an automobile by a garage keeper's son. Both father and son were made defendants, and a recovery was had against each. The father appealed from the judgment against him, denying any legal liability for the acts of his son. *Hall vs. Young & Son, 177 N. W. 694.*

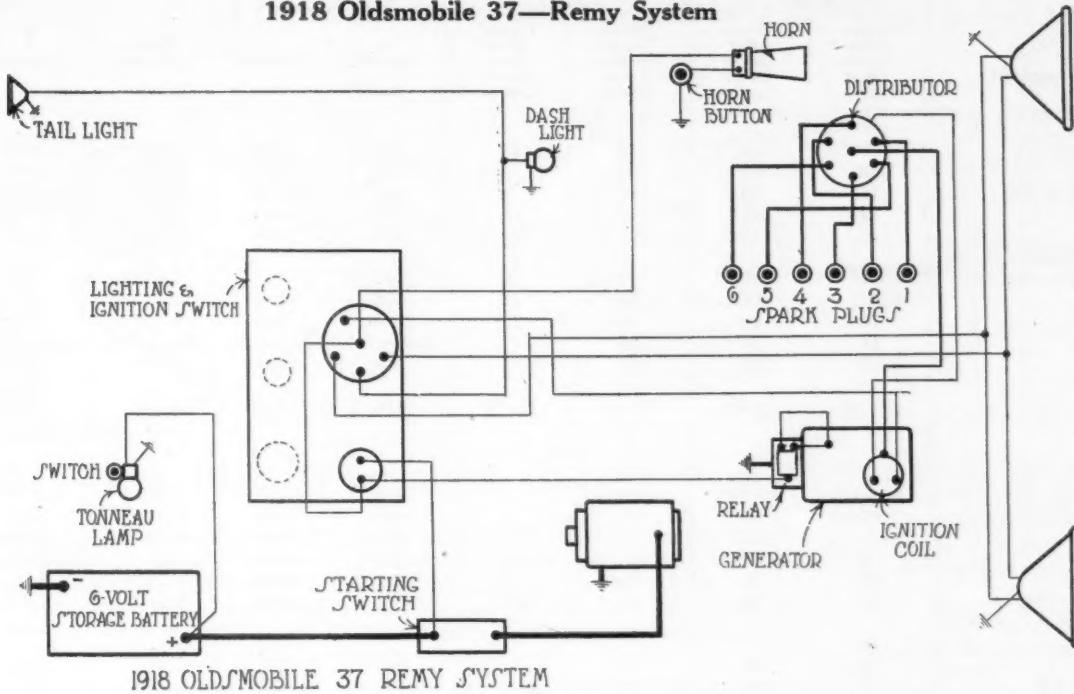
There was evidence tending to show partnership, or at least, that father and son were together interested in the automobile business, operating a garage and selling cars, under the name of Young & Son. They made use of a demonstration number under the name Young &

Son, and worked in the same shop together as if partners. But both father and son denied that they were partners and sought to explain their connection. The court said if the evidence on the question showed that the father was the owner of the car, this fact alone would be sufficient to make out a case on its face showing that he was in control of the car and that the driver was operating it for him, thereby rendering him liable for the accident. But this inference that the owner likely is in control of his own car may be overcome by evidence identifying those operating the car and explaining by what authority, if not his own, it is being run.

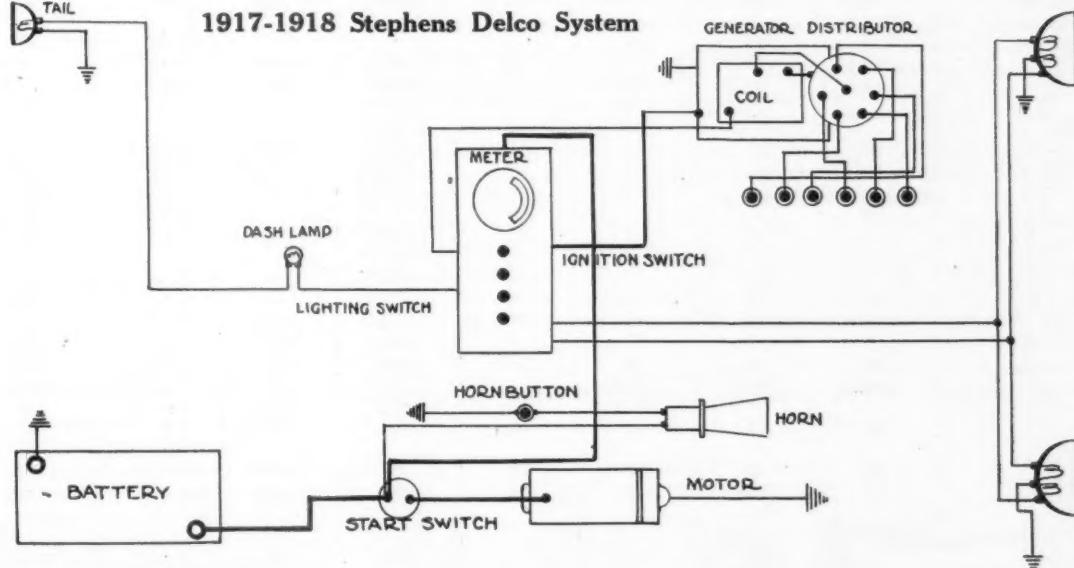
The garagekeeper testified he did not know the driver was using the car at

Motor Age Weekly Wiring Chart No. 95

1918 Oldsmobile 37—Remy System



1917-1918 Stephens Delco System



Name of car and date on which wiring diagrams have appeared in previous issues

Allen—June 17, '20
Apperson—Aug. 5, '20
Auburn—Sept. 9, '20
Briscoe—May 6, '20
Buick—July 15, '20
Case—Aug. 5, '20
Chalmers—June 17, '20

Chandler—May 20, '20
Cole—June 10, '20
Crow-Elkhart—July 29, '20
Davis—Aug. 12, '20—Sept. 2, '20
Dort—Aug. 12, '20
Elcar—May 6, '20
Franklin—June 3, '20
General Battery Charging—Sept. 15, '19
General Magneto Diagram—June 15, '19
Grant—Aug. 12, '20
Harroun—July 15, '20
Haynes—June 24, '20

Hupmobile—May 27, '20
Internal Connections—July 10-17-24, '19
Jeffery—May 13, '20
Jordan—June 10, '20—July 22, '20
King—May 20, '20
Kissel—May 27, '20—Aug. 19, '20
Lexington—July 29, '20
Locomobile—June 3, '20
Moline-Knight—May 20, '20—July 22, '20

Moon—July 29, '20—Aug. 19, '20—Sept. 2, '20
Peerless—May 13, '20
Pierce-Arrow—July 15, '20
Reo—July 22, '20
Roamer—Aug. 5, '20
Saxon—Sept. 9, '20
Scripps-Booth—Aug. 26, '20
Studebaker—July 1, '20
Stutz—July 8, '20
Special Systems for Fords—May 15-22, '19

Valve Timing for 1920 Cars

Motor Age Maintenance Data Sheet No. 114

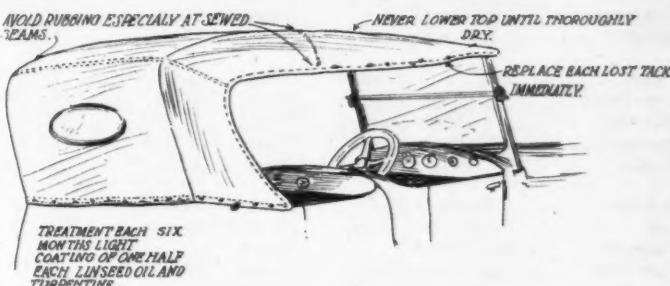
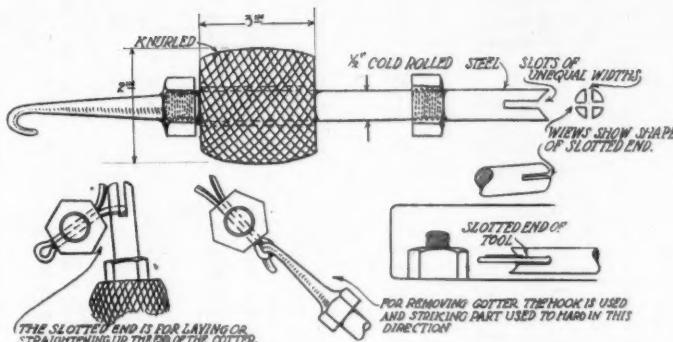
One of a series of weekly pages of information
valuable to service men and dealers—save this page

To be concluded next week.

NAME AND MODEL	VALVE TIMING Measured in Degrees and Minutes						Valve Diameter	Valve Stems		
	Intake		Exhaust		Valve Clearance			Diameter	Length	
	Opens After Upper Dead Center	Closes After Lower Dead Center	Opens Before Bottom Dead Center	Closes After Top Dead Center	Intake	Exhaust				
Ace, TL.....	....	....	....	....	....	....	....	....	....
Allen, 43.....	10	44	48	10	.004	.004	1.625	.375	6.0625	
American, C 6.....	*8	45	45	8	.003	.004	1.75	.434	8.25	
American Beauty, C-55.....	12	40	40	8	.004	.006	1.812	.4375	5.687	
Anderson, 30.....	12	40	40	8	.004	.006	1.5	.3725	5.625	
Apperson, 821-S.....	15	45	55	10	.004	.004	1.5625	.375	7.375	
Apperson, Anniversary.....	....	....	....	....	....	....	....	....	....
Auburn, 639 H-K.....	12	40	40	8	.3125	....	1.6718	.390	5.6875
Argonne, 1920.....	7	57	50	11	.006	.008	2.125	.375	6.	
Bour-Davis, 21S.....	10	28	40	2.5	.004	.006	1.5312	.3723	6.0469	
Brewster, 1920.....	10	50	45	....	Sleeve VI.	Sleeve VI.	Sleeve VI.	Sleeve VI.	Sleeve VI.
Briscoe, 4-34.....	13	35	45	8	.004	.004	1.75	.3725	{6.609 6.593}	
Buick, K 6-45.....	15-10	38-40	12-40	12-10	.010	.010	{1.625 1.25}	{.3730 .3710}	4.843	
Buick, K 6-49.....	....	....	....	....	....	....	....	....	....
Bell.....	....	....	....	....	....	....	....	....	....
Cadillac, 59.....	46-40	46-40	....	....	.002	.002	1.6875	.375	7.156
Case, V.....	10	28	40	....	.003	.003	1.53125	.375	6.
Chalmers, 6-30.....	....	50	50	10	.004	.004	1.60	.3125	6.25
Champion, C-4.....	5	38	47	10	.003	.004	1.5	.375	5.5	
Chandler, 27.....	16	36	46	9	.004	.004	1.3125	.375	6.25	
Cleveland, 40.....	12	40	50	10	.002	.003	1.3125	.3125	4.156	
Chevrolet, 490.....	....	....	....	....	....	....	....	....	....
Chevrolet, FB.....	....	....	....	....	....	....	....	....	....
Cole, 870.....	15	38	45	10	.006	.006	1.5	.375	4.875	
Columbia, D-C & CS.....	12	40	40	8	.004	.006	1.812	.437	5.687	
Comet, C-53.....	....	....	....	....	....	....	....	....	....
Commonwealth.....	50	38	47	10	.003	.004	1.5	.375	5.5	
Crow-Elkhart, L-53-55.....	8	33	40	4	.002	.003	1.68	.4375	5.375	
Crow-Elkhart, H-53-55.....	....	....	....	....	....	....	....	....	....
Cunningham, V-4.....	5	45	55	5	....	....	1.75	.432	6.125
Daniels, D.....	10	50	45	10	1.6875	1.6875	1.4375	.34375	7.5	
Davis, 51-55.....	12	40	40	8	.004	.606	1.5	.3725	5.625	
Dispatch, G.....	....	....	....	....	....	....	....	....	....
Dixie Flyer, HS-70.....	....	....	....	....	....	....	....	....	....
Dodge Brothers.....	10	35	45	8	.004	.004	1.6875	.370	6.531	
Dorris, 6-80.....	10	45	45	45	.34375	.34375	1.875	.4375	5.0625	
Dort, 15.....	5	38	47	10	.003	.003	1.6562	.3735	6.0312	
Douglas, G-18.....	10	....	....	5	....	....	1.625	.4375	6.0
Du Pont, A.....	....	40	45	10	.003	.006	1.75	.375	6.8125
Economy, 6-46.....	....	....	....	....	....	....	....	....	....
Elcar, 4.....	5	38	47	10	.003	.004	1.5	.375	5.5	
Elcar, 6.....	12	40	40	8	.004	.006	1.5	.3725	5.625	
Elgin, K.....	13	42	45	10	.003	.003	1.375	.310	4.5312	
Essex, A.....	7	42	55	8	.006	.008	1.875	.373	5.5625	
Ferris.....	10	28	40	2-30	.004	.006	1.218	.3720	6.046	
Ford, T.....	.0625	5625	.3125	....	.025	.025	1.2656	.3105	4.974
Franklin, 9-B.....	....	57	43-5	25	.010	.010	1.3125	.338	4.7187
Grant, HX.....	13	42	45	10	.004	.004	1.5	.310	4.6875	
Gardner.....	....	....	....	....	....	....	....	....	....
Geronimo.....	15	50	45	10	.004	.004	1.4375	.312	5.375	
Halladay.....	15	50	45	10	.003	.003	1.4375	.3125	5.375	
Hanson, 54.....	....	....	....	....	....	....	....	....	....
Harroun, AA-2.....	....	....	....	....	....	....	....	....	....
Haynes, 45.....	5	35	47	2	.004	.006	1.5625	.4375	5.625	
Haynes, 47.....	15	33	50	15	.035	.035	1.875	.372	3.75	
Huffman, R.....	12	40	40	8	.004	.006	1.5	.3725	5.625	
H. C. S.....	....	....	....	....	....	....	....	....	....
Hollier, 206-B.....	....	....	....	....	....	....	....	....	....
Holmes.....	15	33	50	15	.3125	.3125	1.625	{.371 .3085}	{3.75 3.25}	
Hudson.....	7	42	55	8	.004	.006	1.8125	.370	6.75	
Hupmobile, R.....	12	44	44	12	.004	.004	1.625	.375	5.5625	
Jackson, 638.....	8	40	40	12	.004	.006	1.5	.3725	5.625	
Jones, 28.....	10	28	40	2.5	.002	.003	1.6875	.375	5.875	
Jordan, F.....	....	....	....	....	....	....	....	....	....
Jordan, M.....	12	40	40	8	.004	.006	1.5	.3725	5.625	
King, H.....	....	35	45	6	.0075	.0075	1.6875	.3125	6.2187
Kissel, 45.....	5	35	45	....	.004	.004	1.812	.3735	5.75
Klimekar, 6-55-J.....	10	33	67	8	.004	.004	1.625	.375	5.875	
LaFayette.....	....	46	46	....	.003	.005	1.75	....	....
Leach, B-W.....	10	28	40	2.5	.004	.006	1.531	.3723	6.046	
Lexington, S20.....	12	40	40	8	.004	.006	1.5	.3725	5.625	
Liberty, 10-C.....	8	40	45	6	.002	.003	1.5	.3125	5.5	
Locomobile, 48.....	14	50	50	....	.002	.004	2.125	.433	8.281

The Automotive Repair Shop

Practical Maintenance Hints



Hints on care of the automobile top

Speeding Up the Removal of Cotter Pins

Cotter pins frequently require more time to remove than the nut which these secure, due to the positions in which they are placed. An improvement over the usual tool for the removal and placing of the pins is shown in the sketch.

This consists of a half-inch section of cold rolled steel fashioned with a hooked end at one extremity and with a slotted and "V" shape end at the other extremity. This circular rod is fitted with a knurled striking member that slides on the rod to bring up against shoulders at opposite sides. In use a cotter is extracted by hooking through the eye and bringing the sliding member hard up against the shoulder several times.

The opposite end with the slots is for laying the ends of the cotter over or for straightening them up. These slots which are made with the hacksaw should

be of unequal widths, 3/32 and 1/8 in. are the sizes of cotters most commonly used. These slots aid in placing cotters in inaccessible places, the eye being placed in the slot and it is driven in with a sharp blow on the handle.

The top seldom needs washing and if so only a slight going over with castile or other soap without strong alkali.

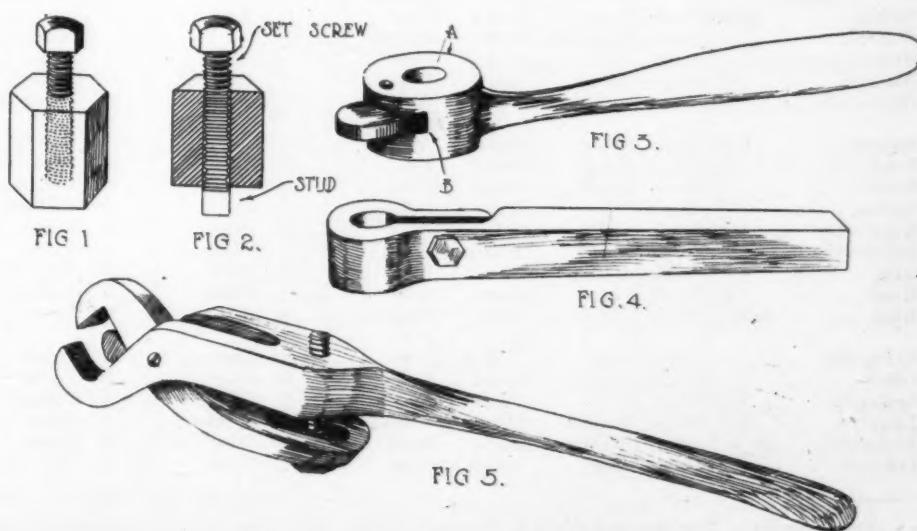
To preserve the flexibility of the rubber-like coating of the cloth, the top should be gone over each six months with a mixture of one-half each of linseed oil and turpentine. The sun dries out the coating and the oil restores this flexibility inasmuch as this soaks into the composition, and the cracks, at the creases when folded, are prevented. Avoid rubbing as much as possible, otherwise the sewed seams will be worn through allowing the pieces to come apart. As mentioned above the oil will protect the coating and likewise the sewed seams especially where the rear

edge of the top joins the body. This occasional treatment with linseed oil is effective, painstaking scrubbing and washing is detrimental, avoid this as much as possible.

Stud Wrenches

There is need around the automotive repair shop for a good stud wrench for removing cylinder head and other studs. The old method of taking them out by the use of two locked nuts and a wrench or the bad practice of using a pipe wrench should be discarded by up-to-date mechanics. In their place make and use one of the sort of wrenches shown in the illustrations.

This consists of a piece of hexagon stock drilled through its center and tapped the size of the stud for which it is needed and a short cap or set screw is screwed into it part way for the larger sizes of studs. This tool requires a good blacksmith to forge it but it is a sure gripping tool and one that can be used on many sizes of studs. This tool should be made of good tool steel. The cap screw A tightens the jaws together.



Wrenches for the removal of cylinder head bolts and other studs

Care and Treatment of the Automobile Top

The heat of the sun and water are natural enemies of the automobile top covering that shorten the life of this fixture unless precautions are taken to safeguard it. Considering the high cost of topping material and the loss of use of the car while it is being retopped, a little attention to this detail will avoid this inconvenience and expense. Similar treatment has been applied to the roof or top of a car with the result after five years of service the top is in excellent condition and has the appearance of one not over a year old.

The first precaution is the replacement of the tacks that fasten the cover to the bows and body. By doing this the cover is prevented from flapping about in the wind and tearing, or ripping the other fasteners loose.

The second precaution is to leave the top up when wet from rain or washing. This prevents mildewing and creasing, which permanently affects the cover.

Specifications of the Electrical Equipment Found on 1920 Passenger Cars

Make and Model	IGNITION			GENERATOR		MOTOR		BATTERY			Wiring System	Units Combined	FUSES			
	System	Make	Control	Make	Voltage	Make	Voltage	Make	Amp.	Hr.	Voltage		Type	Volts	Amp.	
Allen.....43	Single	Conn.	Hand.	West.....	6	West.....	6	U. S. L....	90	6	1	GI....	GT....	6	15	
American.....C	Single	Conn.	Hand.	G & D....	6	G&D....	6	Willard....	110	6	1	S....	3-A....	1.250	20	
Anderson.....All	Single	Remy.	Hand.	Remy....	6	Remy....	6	Willard....	90	6	1	S....				
Apperson.....All	Single	Remy.	Hand.	Bijur....	6-8	Bijur....	6-8	Willard....	90	6	1	S....	Open....	1.250	10	
Auburn.....6-39	Single	Remy.	Hand.	Remy....	6	Remy....	6	Willard....	90	6	1	S....		6-8	25	
Beggs.....20-T		Conn.	Hand.	A-L....	6	A-L....	6	Exide....	90	6	1	GT....	Cart....	6	15	
Bour-Davis.....21	Single	West.	Hand.	West....	6	West....	6	Willard....	111	6	1	S....	GT....	6	15	
Brewster.....	Single	Berling.	Hand.	U. S. L....	12	U. S. L....	12	U. S. L....	12	1						
Briscoe.....4-34	Single	Conn.	Hand.	A-L....	6	A-L....	6	Prest-O-L....	80	6	1	GI....	GT....	6	20	
Buick.....	Single	Delco.	Hand.	Delco....	6	Delco....	6	Willard....	132	6	1	S....				
Cadillac.....59	Single	Delco.	H. & A.	Delco....	6	Delco....	6	Exide....	130	6	1	GM....				
Case.....V-20	Single	Delco.	H. & A.	West....	6	West....	6	Willard....	111	6	1	GI....	5AGT....	50		
Chalmers.....35-C	Single		Hand.		6		6		106	6	1	GI....	GT....	6	15-30	
Champion.....KO	Single	Deleco.	Hand.	Dyneto....	6	Dyneto....	6	Willard....	90	6	1	S....	GT....	6	200	
Chandler.....All	Single	Bosch	Hand.	G & D....	6	G & D....	6	Prest-O-L....	105	6	1	S....	GT....	6		
Chevrolet.....All	Single	Remy.	Hand.	A-L....	6	A-L....	6	Willard....	111	6	1	GI....	GT....	6		
Cleveland.....40	Single	G & D....	Hand.	G & D....	6	G & D....	6	Prest-O-L....	94	6	1	S....	GT....	6	20	
Cole.....All	Single	Delco.	H & A.	Delco....	6	Delco....	6	Prest-O-L....	6	1						
Columbia.....All	Single	At-Kent.	Hand.	A-L....	6	A-L....	6	Prest-O-L....	80	6	1	S....				
Comet.....C-53	Single	Wagner.	Hand.	Wagner....	6	Wagner....	6	Willard....	111	6	1					
Commonwealth.....42	Single	At-Kent.	Hand.	Dyneto....	6	Dyneto....	6	Prest-O-L....	105	6	1		GT....			
Crow-Elkhart.....L-55	Single	Conn.	Hand.	Dyneto....	6	Dyneto....	6	Exide....	120	6	1	Cart....	6	10		
Cunningham.....V-4	Single	Delco.	H & A.	Delco....	6	Delco....	6	Willard....	132	6	1					
Daniels.....8-D	Single	Delco.	H & A.	Delco....	6	Delco....	6	Willard....	132	6	1	S....				
Davis.....51	Single	Delco.	Hand.	Delco....	6	Delco....	6	Willard....	90	6	1	S....				
Dixie Flyer.....	Single	Eisemann.	Hand.	Dyneto....	6	Dyneto....	6	Willard....	90	2						
Dodge Brothers.....	Single	Own.	H & A.	N. E....	12	North East	12	Willard....	49	12	1	GM....	Encl....	1-50	10	
Dorris.....6-80	Single	Bosch.	Hand.	West....	6	West....	6	Willard....	102	6	1	S....	GT....	5-8	15	
Dort.....15	Single	Conn.	Hand.	West....	6	West....	6	U. S. L....	85	6	1	S....		6	10	
du Pont.....A	Single	Eisemann.	H & A.	West....	6	Exide....	115	6	1	S....						
Economy.....6-46	Single	Own.	Hand.	A-L....	6	A-L....	6	Willard....	84	6						
Elcar.....All	Single	Delco.	Hand.	Delco....	6	Delco....	6	Willard....	90	6	1	S....	GT....	6-8	20	
Elgin.....K	Single	Wagner.	Hand.	Wagner....	6	Wagner....	6	Willard....	90	6	1		GT....	6-8	20	
Essex.....A	Single	Delco.	H & A.	Delco....	7	Delco....	6	Exide....	105	6	1	S....				
Ferris.....	Single	Splitdorf.	Hand.	L-N....	6	L-N....	6	Willard....	132	6	1	S....		6-8		
Ford.....T*	Single	Own.	Hand.	Own....	6	Own....	6	Willard....	80	6	1	S....				
Franklin.....9-B	Single	At-Kent.	Auto.	Dyneto....	12	Dyneto....	12	Willard....	67	12	2	GM....	GT....	14	10	
Gardner.....O	Single	West.	Hand.	West....	.6	West....	6	Willard....	90	6	1	S....	GT....	6	20	
Geronimo.....	Single	Delco.	Hand.	Dyneto....	6	Dyneto....	6	Exide....	90	6	1	S....	none	6		
Grant.....H	Single	At-Kent.	Hand.	Bijur....	6	Bijur....	6	Prest-O-L....	90	6	1	S....	2GT....	6-8	15	
Handley-Knight.....	Single	Conn.	Hand.	A-L....	6	A-L....	6	U. S. L....	162.6	6	1	S....	GT....	6-8	20	
Hanson.....54-A	Single	Delco.	Hand.	Delco....	6	Delco....	6	Prest-O-L....	100	6	2					
Harroun.....	Single	Remy.	Hand.	Remy....	6	Remy....	6	Prest-O-L....	80	6	1					
Harvard.....All	Single	Bosch.	Hand.	Dyneto....	6	Dyneto....	6	Prest-O-L....	120	6	1	S....				
Hatfield.....A	Single	Conn.	Hand.	Dyneto....	6	Dyneto....	6	Willard....	111	6	1	GI....				
Haynes.....47	Single	Kingston.	Hand.	Leece-N....	6	Leece-N....	6	Willard....	132	6	1	GI....	GT....	6	5	
H. C. S. Special.....	Single	Delco.	Hand.	Delco....		Delco....		Willard....	111							
Hollier.....206-B	Single	West.	Hand.	West....	6	U. S. L....	80	6	1	S....	GT....	6	20			
Holmes.....	Single	Eisemann.	Auto.	Dyneto....	12	Willard....	69	12	2	S....	GT....	15	15			
Hudson Super-Six.....	Single	Delco.	H & A.	Delco....	7	Delco....	7	Exide....	105	6	1	GM....				
Huffman.....	Single	Conn.	Hand.	Dyneto....	6	Dyneto....	6	Willard....	90	6	1	S....		6	25	
Hupmobile.....R	Single	At-Kent.	Hand.	West....	6	West....	6	Willard....	90	6	1	S....	Encl....	6	10	
Jackson.....6-38	Single	Remy.	Hand.	A-L....	6	A-L....	6	U. S. L....	94	6	1	GI....	GT....	6-8	15	
Jones.....All	Single	Remy.	Hand.	A-L....	6	A-L....	6	Prest-O-L....	120	6	1	GI....	GT....	6	20	
Jordan.....F	Single	Delco.	Hand.	Delco....	6	Delco....	6	Willard....	90	6	1	S....	C. B....			
Jordan.....M	Single	Delco.	Hand.	Delco....	6	Delco....	6	Willard....	90	6	1	S....	C. B....			
Kenworthy.....4-80	Single	Bosch.	Hand.	Bijur....	6	Bijur....	6	Exide....	140	6	1	S....		6	10	
Kenworthy.....6-55	Single	Bosch.	Hand.	West....	6	West....	6	Exide....	140	6	1	S....		6	10	
King.....8	Single	At-Kent.	Hand.	West....	6	West....	6	Prest-O-L....	120	6	1	S....	Cart....	6	10	
Kissel.....All	Single	Remy.	Hand.	Remy....	6	Remy....	6	Willard....	111	6	1	S....	3 A. G....	6	20	
Kline.....6-55-J	Single	Conn.	Hand.	Wagner....	6	Prest-O-L....	80	6	1	S....	5 A. G....	6		6		
LaFayette.....	Single	Delco.	H & A.	Delco....	6	Delco....	6	Exide....	130	6	1	GM....	C. B....			
Leach.....	Double	Delco.	Hand.	Delco....	6	Delco....	6	Prest-O-L....	180	6	1	S....	Cart....	6	15	
Lexington.....S-20	Single	Conn.	Hand.	G. & D....	6	G. & D....	6	Willard....	111	6	1	GT....		6	15-5	
Liberty.....10-C	Single	Wagner.	Hand.	Wagner....	6	Wagner....	6	Prest-O-L....	90	6	1	GI....				
Locomobile.....48-6-7	Dual	Berling.	Hand.	West....	6	West....	6	Exide....	150	6	1	S....	G. T....	6	10	
Lorraine.....	Single	West.	Hand.	West....	6	West....	6	U. S. L....	94	6	1	S....	GT....			

ABBREVIATIONS: *Starting and Lighting in closed models only. Ignition: At-K, Atwater-Kent; Conn., Connecticut; West, Westinghouse; Auto, Automatic; H & A, Hand and Automatic; S. A., Semi-Automatic. Generator: A-L, Auto-Lite; G & D, Gray & Davis; Leece-N, Leece-Neville; Ward-L., Ward-Leonard; N. E., North East; Split, Splitdorf. Motor: A-L, Auto-Lite; G & D, Gray & Davis; Leece-N, Leece-Neville; West, Westinghouse.

Giving Ignition, Starting, Lighting, Battery, Lamp, Spark Plug and Horn Data

LAMP CANDLEPOWER, VOLTAGE AND TYPE OF BASE								SPARK PLUGS			Horn	Make and Model	
Base Contact	HEADLIGHTS		SIDELIGHTS		TAILLIGHTS		DASHLIGHT	Make	Diam. Inches	Thread Pitch			
	Volts	CP.	Volts	CP.	Volts	CP.	Volts	CP.					
Single...	6-8	18	*6-8	4	6-8	2	6-8	2	Champion...	7/8	18	Klaxon...	Allen..... 43
Single...	6-8	15	*6-8	5	3-4	2	d3-4	2	Bethlehem...	7/8	18	Sparton...	American.... C
Single...	6-8	17	.....	.....	6-8	2	6-8	2	A. C.	7/8	18	E. A. L...	Anderson.... All
Double...	6-8	18	*6-8	4	d6-8	2	d6-8	2	A. C.	7/8	18	Sparton...	Apperson.... All
Single...	6-8	15	*6-8	4	6-8	2	6-8	2	Rajah...	7/8	18	E. A.	Auburn..... 6-39
Single...	6-8	21	6-8	4	3-4	2	3-4	2	Champion...	7/8	18	Trojan...	Beggs..... 20-T
Single...	6-8	21	6-8	5	6-8	2	6-8	2	A. C.	7/8	18	Trojan...	Bour-Davis.... 21
Single...	12	36	12	4	6-8	2	d6-8	2	Herz-Boug...	7/8	18	Klaxon...	Brewster.....
Single...	6-8	21	.....	.....	6-8	2	d6-8	2	Champion...	7/8	18	Sparton...	Briscoe..... 4-34
Single...	6-8	15	6-8	4	6-8	2	6-8	2	A. C.	7/8	18	Stewart...	Buick.....
Single...	7	18	8	6	4	2	3-4	2	Titan...	7/8	18	Deleo...	Cadillac..... 59
Single...	6-8	21	6-8	4	6-8	2	6-8	2	A. C.	7/8	18	Klaxon...	Case..... V-20
Single...	6-8	15	6-8	4	6-8	2	6-8	2	A. C.	7/8	18	.....	Chalmers..... 35-C
Single...	6-8	15	.....	.....	6-8	2	6-8	2	A. C.	7/8	18	Garford...	Champion..... KO
Single...	6-8	15	6-8	4	6-8	2	6-8	2	A. C.	7/8	18	Klaxon...	Chandler.... All
Single...	6-8	21	6-8	4	6-8	2	d6-8	4	A. C.	7/8	18	Klaxon...	Chevrolet.... All
Single...	6-8	17	6-8	4	6-8	2	6-8	2	A. C.	7/8	18	Klaxon...	Cleveland.... 40
Single...	6-8	21	*6-8	5	6-8	4	d6-8	5	A. C.	7/8	18	Sparton...	Cole..... All
Single...	6-8	15	*6-8	4	6-8	2	d6-8	2	Champion...	7/8	18	Schwarze...	Columbia.... All
Single...	6-8	18	.....	.....	6-8	2	6-8	4	A. C.	7/8	18	Klaxon...	Comet..... C-53
Single...	6-8	21	6-8	4	6-8	2	d6-8	2	A. C.	7/8	18	E. A. L...	Commonwealth.... 42
Single...	6-8	15	6-8	4	6-8	2	d6-8	2	Champion...	7/8	18	E. A. Lab...	Crow-Elkhart.... L-55
Single...	6-8	21	6-8	4	6-8	2	6-8	2	Champion...	7/8	18	Sparton...	Cunningham.... V-4
Single...	6-8	21	6-8	4	6-8	2	d6-8	2	A. C.	7/8	18	Klaxon...	Daniels..... 8-D
Single...	6-8	21	.....	.....	6-8	2	6-8	2	A. C.	7/8	18	Klaxon...	Davis..... 51
Double...	6-8	15	.....	.....	d3-4	2	d3-4	2	Champion...	7/8	18	Garford...	Dixie Flyer.....
Single...	12-16	15	.....	.....	12-16	2	12-16	2	A. C.	7/8	18	NorthEast...	Dodge Brothers.....
Single...	6-8	21	6-8	4	6-8	2	6-8	2	Opt...	7/8	18	Klaxon...	Dorris.....
Single...	6-8	15	.....	.....	6-8	2	d6-8	2	A. C.	7/8	18	Schwarze...	Dort..... 15
Single...	6-8	21	6-8	4	6-8	2	6-8	2	A. C.	7/8	18	Klaxon...	du Pont..... A
Single...	6-8	21	6-8	4	6-8	2	d6-8	2	.....	.....	.....	Economy...	6-46
Single...	6-8	21	6-8	4	6-8	2	6-8	2	Champion...	7/8	18	E. A. L...	Elcar..... All
Single...	6-8	21	.....	.....	6-8	2	6-8	2	Champion...	7/8	18	E. A. L...	Elgin..... K
Single...	6-8	15	.....	.....	3-4	2	*3-4	2	A. C.	18 m.m.	1.5 m.m.	Sparton...	Essex..... A
Single...	6-8	21	6-8	6	6-8	2	6-8	4	Champion...	7/8	18	Klaxon...	Ferris.....
Sgl.&Dbl.	6-8	17	6-8	2	6-8	2	6-8	2	Champion...	1/2	18	Own...	Ford..... T
Double...	12-16	15	*12-16	4	6-8	2	6-8	2	Opt...	7/8	18	Klaxon...	Franklin..... 9-B
Single...	6-8	15	.....	.....	6-8	2	6-8	2	Champion...	7/8	18	Trojan...	Gardner..... G
Single...	6-8	21	.....	.....	6-8	2	6-8	2	Champion...	7/8	18	Trojan...	Geronimo.....
Single...	6-8	15	6-8	4	6-8	2	6-8	2	Champion...	7/8	18	Trojan...	Grant..... H
Single...	6-8	21	6-8	4	6-8	2	6-8	2	Champion...	7/8	18	Sparton...	Handley-Knight.....
Single...	6-8	15	.....	.....	6-8	3	6-8	3	Champion...	7/8	18	Schwarze...	Hanson..... 54-A
Single...	6-8	15	.....	.....	3-4	2	d3-4	2	A. C.	7/8	18	.....	Harroun.....
Double...	6-8	21	6-8	5	6-8	2	6-8	2	Bethlehem...	7/8	18	Klaxon...	Harvard.... All
Single...	6-8	15	*4-8	4	6-8	4	6-8	2	A. C.	7/8	18	Ecco...	Hatfield..... A
Single...	6-8	15	*6-8	12	6-8	2	6-8	2	A. C.	7/8	18	Klaxon...	Haynes..... 47
Single...	6-8	15	6	4	3-4	2	3-4	2	A. C.	7/8	18	Sparton...	H. C. S. Special.....
Single...	6-8	15	6	4	3-4	2	3-4	2	A. C.	7/8	18	Sparton...	Hollier..... 206-B
Double...	12-16	21	.....	.....	6-8	2	6-8	2	Bethlehem...	7/8	18	Klaxon...	Holmes.....
Single...	6-8	15	6-8	4	3-4	2	*3-4	2	A. C.	7/8	18	Sparton...	Hudson Super Six.....
Single...	6-8	15	.....	.....	6-8	2	6-8	2	A. C.	7/8	18	Sparton...	Huffman.....
Single...	6-8	15	.....	.....	6-8	2	6-8	2	A. C.	7/8	18	Trojan...	Hupmobile..... R
Single...	6-8	15	6-8	4	3-4	2	3-4	2	A. C.	7/8	18	Sparton...	Jackson..... 6-38
Double...	6-8	15	*6-8	4	s6-8	2	s6-8	2	Champion...	7/8	18	Newtone...	Jones.....
Single...	6-8	18	*6-8	4	6-8	3	6-8	3	A. C.	7/8	18	Sparton...	Jordan..... F
Single...	6-8	18	6-8	4	6-8	3	6-8	3	A. C. & Rajah	7/8	18	Sparton...	Jordan..... M
Single...	6	50	6	30	6	2	6	2	Rajah...	7/8	18	Sparton...	Kenworthy..... 4-80
Single...	6-8	21	6	.....	6-8	2	6-8	2	A. C.	7/8	18	Sparton...	Kenworthy..... 6-55
Single...	6-8	15	*6-8	4	6-8	2	6-8	2	Champion...	7/8	18	Sparton...	King..... 8
Double...	6-8	18	.....	.....	d6-8	2	d6-8	2	A. C.	7/8	18	Sparton...	Kissel.....
Single...	6-8	15	.....	.....	6-8	2	d6-8	2	Champion...	7/8	18	Klaxon...	Kline..... 6-55-J
Single...	6-8	21	6-8	4	3-4	2	3-4	2	A. C.	7/8	18	Klaxon...	LaFayette.....
Single...	6-8	32	6-8	5	6-8	2	6-8	2	Champion...	7/8	18	Klaxon...	Leach.....
Single...	6-8	21	6-8	4	6-8	2	d6-8	4	Bethlehem...	7/8	18	E. A. L...	Lexington..... S-20
Single...	6-8	15	*6-8	4	6-8	2	d6-8	2	A. C.	7/8	18	United...	Liberty..... 10-C
Single...	6-8	21	6-8	4	6-8	2	6-8	2	Titan...	7/8	18	Klaxon...	Locomobile..... 48-6-7
Single...	6-8	17	.....	.....	6-8	2	6-8	2	A. C.	7/8	18	Schwarze...	Lorraine.....

Battery: Prest-O-L, Prest-O-Lite. Wiring system: GI, Generator and Ignition combined; GIM, Generator, Ignition, Motor combined; S, Generator, Motor Ignition separate; GM, Generator and Motor combined. Fuses: GT, Glass Tube; Cart, Cartridge; C. B., Circuit Breaker. Lamps: *Dashlights in series with taillights; headlight contains sidelight; d,—double contact; s,—single contact.

Specifications of the Electrical Equipment Found on 1920 Passenger Cars

Make and Model	IGNITION			GENERATOR	MOTOR	BATTERY				Wiring System	Units Combined	FUSES				
	System	Make	Control	Make	Voltage	Make	Voltage	Make	Amp. Hr.	Voltage		Type	Volts	Amp.		
Maibohm	B	Single	At-Kent . . .	Hand . . .	Bijur . . .	6	Bijur . . .	6	Willard . . .	90	6	1	S.	2-A . . .	6	20
Marmon	34	Single	Delco . . .	Auto . . .	Delco . . .	6	Delco . . .	6	Willard . . .	153	6	1	GI			
Maxwell	25	Single	At-Kent . . .	Hand . . .	6	6	6	6	Prest-O-L. . .	87½	6	1	S.	3A	6	20
McFarlan	127	Double	Opt.	Hand . . .	West . . .	6	West . . .	6	Willard . . .	132	6	1	GI	5 A. G . . .	6	Sing.
Mercer	Ser. 5	Single	Eisemann . . .	Hand . . .	West . . .	6	West . . .	6	Willard . . .	153	6	1	S.	Cart	10	Sing.
Meteor	KR	Single	Simms . . .	Hand . . .	West . . .	6	West . . .	6	Willard . . .	118	6	1	5 A. G . . .	6	10	Sing.
Metz, Master Six	Metz, Master Six	Single	Conn.	Hand . . .	West . . .	6	West . . .	6	Willard . . .	111	6	1	S.			
Mitchell	F-40	Single	Remy	Hand . . .	Remy . . .	6	Remy . . .	6	Willard . . .	90	6	1	GI	GT	6	10
Monitor	Single	Conn.	Hand . . .	Dyneto . . .	6	Dyneto . . .	6	Prest-O-L. . .	110	6	1					
Monroe	S-9	Single	Conn.	Hand . . .	A-L . . .	6	A-L . . .	6	U.S. L. . .	80	6	1				Dou.
Moon	6-48	Single	Delco	Auto . . .	Delco . . .	6	Delco . . .	6	Exide . . .	120	6	1	S.			Sing.
Moon	6-68	Single	Delco	Auto . . .	Delco . . .	6	Delco . . .	6	Exide . . .	120	6	1	S.			Sing.
Moore	F	Single	Conn.	Hand . . .	A-L . . .	6	A-L . . .	6	Willard . . .	90	6	2				Sing.
Nash	Single	Wagner . . .	H & A . . .	Delco . . .	6	Wagner . . .	6	Willard . . .	111	6	1	S.			Sing.	
National	Series BB	Single	Delco	H & A . . .	West . . .	6	West . . .	6	Prest-O-L. . .	110	6	1	S.	GT	6-8	5
Nelson	D	Single	Bosch	Hand . . .	U. S. L. . .	12	U. S. L. . .	12	Willard . . .	69	12	2	S.	G.	12	5-30
Noma	1-B	Single	Delco	Hand . . .	Delco . . .	6	Delco . . .	6	Willard . . .	90	6				6	Sing.
Norwalk	4-30KS	Single	Delco	Dyneto . . .	6	Dyneto . . .	6	Willard . . .	80	6	1					
Oakland	34-B	Single	Remy	Hand . . .	Remy . . .	6-8	Remy . . .	6	Prest-O-L. . .	100	6-8	1	GI			Sing.
Ogren	6-60	Single	Bosch	Hand . . .	West . . .	6	West . . .	6	Willard . . .	111	6	1	Cart	6	10	Sing.
Oldsmobile	37-A	Single	Remy	Hand . . .	Remy . . .	6	Remy . . .	6	Willard . . .	80	6	1				Sing.
Oldsmobile	45-B	Single	Delco	H & A . . .	Delco . . .	6	Delco . . .	6	Willard . . .	90	6	1				Sing.
Olympian	45	Single	Conn.	Hand . . .	A-L . . .	6	A-L . . .	6	U. S. L. . .	6	6					Sing.
Overland	4	Single	Conn.	Hand . . .	A-L . . .	6-8	A-L . . .	6	U. S. L. . .	80	6-8	1	GI	Glass	6	20
Packard Single Six	Single	Delco	H & A . . .	At-Kent . . .	6	At-Kent . . .	6		6-8				S.		6	Sing.
Packard Twin Six	Single	Delco	H & A . . .	Bijur . . .	6	Bijur . . .	6	Willard . . .	134	6	1	S.	GT	6	10	
Paige	All	Single	At-Kent	H & A . . .	G & D . . .	6	G & D . . .	6	Willard . . .	111	6	1	S.	G	20	Sing.
Pan-American	All	Single	West	Hand . . .	West . . .	6	West . . .	6	Willard . . .	111	6	1	S.	G	6	Sing.
Paterson	6-50	Dual	Delco	Hand . . .	Delco . . .	6	Delco . . .	6	Willard . . .	90	6	1				Sing.
Peerless	Ser. 6	Single	At-Kent	H & A . . .	A-L . . .	6	A-L . . .	6	Willard . . .	125	6	1	GT	6	10	Sing.
Piedmont	4-30	Single	Delco	Hand . . .	Dyneto . . .	6	Dyneto . . .	6	Willard . . .	90	6	1	S.			Sing.
Piedmont	6-40	Single	Remy	Hand . . .	Remy . . .	6	Remy . . .	6	Willard . . .	90	6	1	S.			Sing.
Pierce-Arrow	38&48	Double	Delco	H & A . . .	West . . .	6-8	West . . .	6	Willard . . .	153	6	1	S.	GT	6-8	10
Pilot	6-45	Dual	Delco	Hand . . .	Delco . . .	6	Delco . . .	6	Prest-O-L. . .	80	6	1	GI			Sing.
Porter	46	Dual	Berling	Hand . . .	West . . .	12	West . . .	12	Prest-O-L. . .	118	12	1	S.	Cart	12	15
Premier	6-D	Single	Delco	Hand . . .	Delco . . .	6	Delco . . .	6	Willard . . .	111	6	1	S.			Dou.
Reo	T & U	Single	Remy	Hand . . .	Remy . . .	6	Remy . . .	6	Willard . . .	111	6	2	GI	Wire	6	5
Reo	T 6& U 6	Single	North East	Hand . . .	North East	6	North East	6	Willard . . .	111	6	1	S.	Wire	6	6
Revere	Single	Bosch	Hand . . .	West . . .	6	West . . .	6	Willard . . .	153	6	1	J. S.	GT	6	15	
Roamer	6-54E	Single	Bosch	Hand . . .	Bijur . . .	6	Bijur . . .	6	Columbia . . .	117	6	1	S.	3A	6	Sing.
Roamer	4-75E	Single	Bosch	Hand . . .	West . . .	6	West . . .	6	Columbia . . .	117	6	1	S.	5 A. G . . .	6	15
R & V Knight	J & R	Single	Wagner	Hand . . .	Wagner . . .	6	Wagner . . .	6	Willard . . .	111	6	1	S.	Cart	250	20
Saxon	125	Single	Remy	Hand . . .	Wagner . . .	6	Wagner . . .	6	Prest-O-L. . .	80	6	1	S.	Cart	6-8	15
Sayers	C.P.	Single	Delco	Hand . . .	Delco . . .	6	Delco . . .	6	Willard . . .	90	6	1	GI	C.B.		Sing.
Scripps-Booth	B	Single	Remy	Hand . . .	Remy . . .	6	Remy . . .	6	Prest-O-L. . .	85	6	1	GI	GT	6	20
Seneca	L	Single	Conn.	Hand . . .	Allis Chalm .	6	Allis Chalm .	6	Prest-O-L. . .	88	6	1	GM.			Sing.
Severin	H	Single	Wagner	Hand . . .	Wagner . . .	6	Wagner . . .	6	Campbell . . .	110	6	1	None	Cart	6	10
Singer	20	Single	Philbrin	Hand . . .	West . . .	6-8	West . . .	6	Willard . . .	153	6	1	S.	G. C.	6	15-20
Skelton	35	Single	Conn.	Hand . . .	West . . .	6	West . . .	6	Prest-O-L. . .	85	6	1	S.		6	Sing.
Spacke	S-20	Single	Dixie	Hand . . .	West . . .	6	West . . .	6	Willard . . .	153	6	1	S.W.	2-A	6	Sing.
Standard	8-1	Double	Dixie	Hand . . .	West . . .	6	West . . .	6	Willard . . .	90	6	1	G.	Cart	6	20
Stanley	735	Single	Remy	Hand . . .	West . . .	6	West . . .	6	Willard . . .	153	6	1	S.	Cart	6	Sing.
Stanwood	A	Single	At-Kent	Hand . . .	West . . .	12	West . . .	12	Willard . . .	69	12	1	S.	Cart	12	20
Stearns	SKL-4	Single	At-Kent	Hand . . .	A-L . . .	6	A-L . . .	6	U. S. L. . .	116	6	1	S.	Cart	6	Sing.
Stephens	80	Single	Conn.	Hand . . .	West . . .	6-8	West . . .	6-8		6-8		1	S.	Cart	6	20
Stevens-Duryea	E	Double	Berling	Hand . . .	West . . .	6	West . . .	6	Willard . . .	111	6-8	1	S.	Cart	6	Sing.
Studebaker	All	Single	Wagner	Hand . . .	Wagner . . .	6	Wagner . . .	6	Willard . . .	111	6-8	1	S.	Cart	6	10
Stuts	H	Double	Hand	Hand . . .	Remy . . .	6	Remy . . .	6	Willard . . .	132	12	1				Dou.
Templar	445	Single	Simms	Hand . . .	Bijur . . .	6	Bijur . . .	6	Prest-O-L. . .	100	6	1	S.	Cart	6	20
Texan	B-38&A-38	Single	Conn.	Hand . . .	Bijur . . .	6	Bijur . . .	6	Prest-O-L. . .	80	6	1	S.	Cart	6	20
Tulsa	E-1,2,3	Single	Conn.	Hand . . .	Dyneto . . .	6	Dyneto . . .	6	Exide . . .	90	6	1	S.	GT	6	15
Velie	34	Single	At-Kent	S. A. . .	West . . .	6	West . . .	6	Willard . . .	108	6	1	S.	Wire		15
Velie	48	Single	At-Kent	S. A. . .	Bijur . . .	6	Bijur . . .	6	Willard . . .	111	6	1	S.	Wire		15
Vogue	6-55 & 6-66	Single	Conn.	Hand . . .	A-L . . .	6	A-L . . .	6	Willard . . .	111	6	1		Cart	1-250	15
Wasp	Single	Bosch	Hand . . .	West . . .	6	West . . .	6	Exide . . .	135	6	1	S.	Cart	6	20	
Westcott	C-38&C-48	Single	Delco	H & A . . .	Delco . . .	6	Delco . . .	6	Willard . . .	111	6	1	S.	CB		Sing.
Willys-Knight	20	Single	Conn.	Hand . . .	A-L . . .	6-8	A-L . . .	6	U. S. L. . .	170	6	1	GI	GT	6	20
Winton Six	24	Single	Bosch	Hand . . .	Bijur . . .	6	Bijur . . .	6	Willard . . .	132	6	1	S.	GT	6	15
Winton Six	25	Single	Bosch	Hand . . .	Bijur . . .	6	Bijur . . .	6	Willard . . .	125	6	1	S.	CB		Sing.
Winther	61	Single	West	Hand . . .	West . . .	6	West . . .	6	Willard . . .	111	6	1	S.	GI	6	10

Giving Ignition, Starting, Lighting, Battery, Lamp, Spark Plug and Horn Data

LAMP CANDLEPOWER, VOLTAGE AND TYPE OF BASE								SPARK PLUGS			Horn	Make and Model	
Base Contact	HEADLIGHTS		SIDELIGHTS		TAILLIGHTS		DASHLIGHT		Make	Diam. Inches	Thread Pitch		
	Volts	CP.	Volts	CP.	Volts	CP.	Volts	CP.					
Single...	6-8	20	6-8	4	6-8	2	6-8	2	A. C.	7/8	18	Schwarze	Maibohm.....B
Single...	6-8	27	*6-8	8	6-8	2	6-8	2	A. C.	7/8	18	Sparton	Marmon.....34
Single...	6-8	15			6-8	2	6-8	2	Champion....	7/8	18	Schwarze	Maxwell.....25
Single...	6-8	21	*6-8	12	6-8	2	d6-8	2	A. C.	7/8	18	Klaxon	McFarlan.....127
Single...	6-8	20	6-8	5	6-8	2	6-8	4	Champion....	7/8	18	Sparton	Mercer.....Ser. 5
Single...	6-8		6-8		6-8		6-8		A. C.			Meteor	K R
Single...	6-8	16	6-8	4	6-8	2	6-8	2	Champion....	7/8	18	Trojan	Metz, Master Six....
Single...	6-8	21	6-8	4	6-8	2	d6-8	2	A. C.	7/8	18	Sparton	Mitchell.....F-40
Double...	6-8	16			6-8	2	6-8	2	Champion....	7/8	18	Klaxon	Monitor.....
Single...	6-8	20			6-8	2	d6-8	2	Champion....	7/8	18	Trojan	Monroe.....S-9
Single...	6-8	20			6-8	2	d6-8	2	Champion....	7/8	18	Klaxon	Moon.....6-48
Single...	6	20	6-8		6-8	2			Champion....	7/8	18	Garford	Moon.....6-68
Single...	6-8	15	6-8	4	6-8	2	d6-8	2	A. C.	7/8	18	Trojan	Moore.....F
Single...	6-8	20	*6-8	4	6-8	2	6-8	2	A. C.	7/8	18	Sparton	National.....Series BB
Double...	12-16	15	12-16	4	12-16	2	12-16	2	Champion....	18 m.m.		Schwarze	Nelson.....D
Single...	6-8				6-8		d6-8					Noma	1-B
Single...	6-8	17			6	2	6	2	Champion....	7/8	8	Stewart	Norwalk.....4-30 KS
Single...	6-8	15			6-8	2	6-8	2	A. C.	7/8	18	Schwarze	Oakland.....34-B
Single...	6	32	6		6	4	6	4	Champion....	7/8	18	Klaxon	Ogren.....6-60
Single...	6-8	15	6-8	4	6-8	2	6-8	2	A. C.	7/8	18	Klaxon	Oldsmobile.....37-A
Single...	6-8	15	6-8	4	6-8	2	6-8	2	Champion....	7/8	18	Klaxon	Oldsmobile.....45-B
Single...	6-8	15	6-8	4	6-8	2			E. A. Lab.			Olympian	.45
Single...	6-8	16			3-4	2	*3-4	2	Champion....	1/2		A. L.	Overland.....4
Single...	6-8		6-8	4	6-8	2	6-8	2		7/8	18	Packard	Single Six....
Single...	6-8	21	*6-8	4	6-8	2	6-8	2	A. C.	7/8	18	Sparton	Packard Twin Six....
Single...	6-8	17	6-8	4	6-8	2	d6-8	2	A. C.	7/8	18	Trojan	Paige.....All
Single...	6-8	32			6-8	2	*3-4	4	A. C.	7/8	18	E. A. Lab.	Pan-American.....All
Single...	6-8	15	6-8	4	6-8	2	6-8	2	A. C.	7/8	18	Paterson	Peerless.....6-50
Single...	6-8	21	6-8	4	6-8	2	6-8	2	Champion....	7/8	18	Sparton	Piedmont.....Ser. 6
Single...	6-8	12			6	2	6	2	Champion....	7/8	18	Klaxon	Piedmont.....4-30
Single...	6-8	12			6	2	6	2	Champion....	7/8	18	Klaxon	Piedmont.....6-40
Single...	6-8	20			6-8	5	6-8	5	A. C.	7/8	18	Klaxon	Pierce-Arrow.....38&48
Single...	6-8	15			6-8	2	6-8	2	A. C.	7/8	18	Schwarze	Pilot.....6-45
Single...	12-16	20	12-16	4	12-16	4	12-16	2	A. C.	7/8	18	Stewart	Porter.....46
Double...	6-8	21	*6-8	4	6-8	2	d6-8	2	A. C.	7/8	18	Klaxon	Premier.....6
Double...	7	15			3-4	2	*3-4	2	A. C.	1/2		Trojan	Reo.....T & U
Single...	7	15			6	2	6	2	A. C.	1/2	18	North East	Reo.....T6 & U6
Single...	6-8	20	*6-8	8	6-8	4	6-8	4	Optional....	7/8	18	Klaxon	Revere.....
Single...	6-8	15	6-8	8	6-8	2	6-8	2	A. C.	7/8	18	Sparton	Roamer.....6-54E
Single...	6-8	15	6-8	8	6-8	2	6-8	2	A. C.	7/8	18	Sparton	Roamer.....4-75E
Single...	6-8	15	6-8	4	6-8	2	d6-8	4	A. C.	7/8	18	Klaxon	R & V Knight. J. & R.
Single...	6-8	15			6-8	2	d6-8	2	A. C.	7/8	18	Trojan	Saxon.....125
Single...	6-8	15			6-8	2	d6-8	2	Champion....	7/8	18	Stewart	Sayers.....C. P.
Single...	6-8	18			6-8	2	6-8	2	A. C.	7/8	18	Klaxon	Scripps-Booth.....B
Single...	6-8	15	6-8*	2	6-8	2	d6-8	2	A. C.	7/8	18	Fitzgerald	Seneca.....L
Double...	6	17	6	5	6	2	6	2	Champion....	7/8	18	Klaxon	Severin.....H
Double...	6-8	15			6-8	2	d6-8	2	A. C.	7/8	18	Klaxon	Singer.....20
Single...	6	18			6	2	6	2	Bethlehem....	7/8	18	Klaxon	Skelton.....35
Single...	6-8	21	6-8	4	6-8	2	6-8	2	A. C.	7/8	18	Klaxon	Spacke.....S-20
Single...	6-8	21	6-8	4	6-8	2	6-8	2	A. C.	7/8	18	Klaxon	Standard.....8-I
Double...	6-8	21	6-8	4	6-8	2	6-8	2				Stanley	735
Single...	6	17	6	10	6	7	6-8	2	A. C.	7/6	18	Klaxon	Stanwood.....A
Single...	12-16	21	*12-16	4	12-16	2	12-16	2	A. C.	7/8	18	B.&A. Lab.	Stearns.....SKL-4
Single...	6-8	15	6-8	2	6-8	2	6-8	2	Champion....	7/8	18	Klaxon	Stephens.....80
Single...	6-8	21	6-8	4	6-8	2	6-8	2	A. C.	7/8	18	Klaxon	Stevens-Duryea.....E
Single...	6-8	12			6-8	2	6-8	2	Champion....	1/2		Sparton	Studebaker.....All
Double...	6-8	15	*6-8	4	6-8	2	6-8	2	A. C.			Klaxon	Stutz.....H
Single...	6-8	21	*6-8	4	6-8	2	6-8	2	Champion....	7/8	18	Klaxon	Templar.....445
Single...	6	16			6	2	6-8	2	A. C.	7/8	18	Klaxon	Texan.....B38&A38
Single...	6-8	21	6-8	2	6-8	2	d6-8	2	Champion....	7/8	18	Trojan	Tulsa.....E-1,2,3
Single...	6-8	15	6-8	4	6-8	2	d6-8	4	Champion....	7/8	18	E. A. Lab.	Velie.....34
Single...	6-8	15	6-8	4	6-8	2	d6-8	4	Champion....	7/8	18	Sparton	Velie.....48
Single...	6-8	21	6-8	4	6-8	2	6-8	2	A. C.	7/8	18	Klaxon	Vogue.....6-55 & 6-66
Single...	6-8	18	*6-8	4	3-4	2	d3-4	2	A. C.	7/8	18	Klaxon	Wasp.....
Single...	6-8	30			3-4	2	*3-4	2	Champion....	7/8	18	Sparton	Westcott.....C-38&C-48
Single...	6-8	21	6-8	6	6-8	2	6-8	2	Champion....	7/8	18	American	Willys-Knight.....20
Single...	6-8	21	6-8	6	6-8	2	6-8	2	Champion....	7/8	18	Winton Six	Winton Six.....24
Single...	6	18			6	4	6	2	Champion....	7/8	18	Electric	Winton Six.....25
Single...	6	18							A. C.	7/8	18	Winther	Winther.....61

Battery: Prest-O-L, Prest-O-Lite. Wiring system: GI, Generator and Ignition combined; GIM, Generator, Ignition, Motor combined; S, Generator, Motor Ignition separate; GM, Generator and Motor combined. Fuses: GT, Glass Tube; Cart, Cartridge; C. B., Circuit Breaker. Lamps: *Dashlights in series with taillights; headlight contains sidelight; d,—double contact; s,—single contact.

From the Four Winds

Glimpses at the World of Motordom

COMING MOTOR EVENTS

Automobile Shows

Cincinnati	Annual Passenger Car Show	Sept. 18-25
Memphis, Tenn.	Annual Passenger and Commercial Car Show	Sept. 25-Oct. 2
Buffalo	Closed Car Show	Sept. 27-Oct. 2
Minneapolis	Closed Car Show	Oct. 5-9
Northampton, Mass.	Annual Automobile Show	Oct. 6-8
Jersey City, N. J.	Annual Automobile Show	Nov. 15-20
New York	Automobile Salon	Nov. 14-21
Chicago	Automotive Equipment Show	Nov. 15-20
New York	National Passenger Car Show	Jan. 8-15, 1921
Chicago	National Passenger Car Show	Jan. 29-Feb. 4, 1921
Minneapolis	Winter Show	Feb. 5-12, 1921

Tractor Shows

Peoria, Ill.	National Implement and Power Farming Show	Sept. 17-26
Los Angeles, Cal.	National Tractor and Implement Show of the West	Sept. 20-26
Columbus, O.	National Tractor Show	Feb. 6-12, 1921

Foreign Shows

London	Commercial Vehicles, Exhibition, Olympia	October
London	Passenger Car Show, Olympia	November 4-13
Christchurch, N. Z.	Olympia Motor Exhibition	Nov. 6-13
Sydney, Australia	Motor Show	Jan. 7, 1921

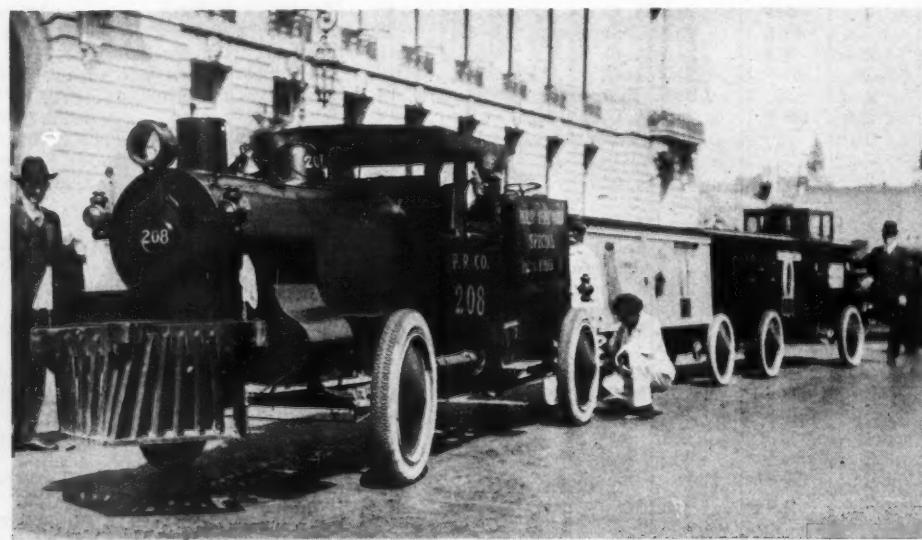
Races

Syracuse, N. Y.	Dirt Track	Sept. 17-18
Allentown, Pa.	Dirt Track	Sept. 25
Los Angeles, Cal.	Speedway Race	Nov. 25

Conventions

Atlantic City	National Implement and Vehicle Assn. Twenty-seventh Annual Convention	Oct. 20, 21, 22
Cincinnati	Ohio Automobile Trade Assn. Fourth Annual Convention	Dec. 8-10
Chicago	N. A. D. A. Annual Meeting	Jan. 31-Feb. 1, 1921

Get Free Publicity Like This Dealer Does



With such a design as this, dealers whose ingenuity is often taxed to the utmost may find a way out of their difficulty on one occasion at least in providing a float for parade purposes. This miniature railway train that has been traversing the cities of California consists of a locomotive, tender, box car and caboose. There are chimes in the caboose. Incidentally, this especial train can operate on gasoline, distillate, coal or crude oil. It has made 75 m.p.h. on race tracks while it averages 30 m.p.h. on the highways. It was originated by Roy R. Meads and L. S. Rounsville of the Pacific Rubber Co.

PERSONALS

M. L. Pulford has been appointed service engineer in charge of the service department of The Commerce Motor Car Company, Detroit. Mr. Pulford has been in the employ of Commerce for the past seven years, most of his time in the engineering department.

Will L. Cave, former Studebaker service manager at Kansas City and more recently of the Detroit branch, and S. W. Bumpus, lately connected with the agency for the same car at Hopkinsville, Ky., have joined the forces of the Volunteer Auto Co., Nashville, Tenn., distributors of the Studebaker.

C. A. Haertel, a well known and very successful manufacturer of Waukesha, Wis., is president of the Waukesha Motor Co. H. L. Horning, secretary and general manager, and James B. Fisher, chief engineer.

Julius Janes, formerly president of the Standard Steel Castings Co. of Cleveland, has recently concluded an arrangement with the Farrell-Cheek Steel Foundry Co. of Sandusky, Ohio, by which he will be sales representative of this organization in Cleveland and Cuyahoga County.

Frank Lynn, southwestern representative of the Perkins-Campbell Co., has joined the staff of the Cincinnati Ball Crank Co., which he will serve in a similar capacity in the same territory.

Norman H. Halliday, for several years manager of the Mack Motor Truck Co., in the Cambridge, Mass., district, has been promoted to the office of New England district manager. He will be succeeded as branch manager by Wilbur M. Maynard, formerly of the Dodge organization and for several months assistant to Mr. Halliday.

Alexander Matheson, who has just been discharged from government service, has returned to the Motor Parts Co. as vice-president and manager of the Boston branch.

W. P. Glynn has been made manager of the Boston branch of the McGraw Tire & Rubber Co., succeeding R. R. Winteringer who has been placed in charge of the Cleveland branch.

BUSINESS NOTES

The McNamee Hill Motor Car Co. has been appointed distributors for the Lincoln motor car for Missouri and western Illinois. A sales and service building is being erected at Delmar and Clarendon Aves., St. Louis, and will be occupied about the middle of August.

United Motors Service, Inc., Detroit, is distributing the first edition of a catalogue, "Genuine Delco and Remy Electrical Parts," which is of special value and interest to those who are called upon to furnish these equipments. The purpose of publishing the catalogue is to simplify the ordering of the more commonly used service parts.

The Cadillac Metal Parts Co., Detroit, manufacturing fenders, hoods, gasoline tanks and metal cabs for trucks and tractors, has started operations.

The power house and lumber yard of the Millsbaugh and Irish Co.'s automobile body manufacturing plant at Indianapolis was destroyed by fire recently with a loss of approximately \$30,000.

A receiver for the Indianapolis Body Corp., builders of automobile bodies, was asked in a suit filed in the Circuit Court, July 30, by the Peoples Coal & Cement Co.

The Stutz fire engine, manufactured by the Stutz Fire Engine Co., Indianapolis, made a perfect score in a twelve-hour pumping test recently at the international convention of fire chiefs and underwriters at Toronto, Can.